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The
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IF YOU ARE INTERESTED IN MEDICAL TECHNOLOGY AS A PROFESSION

Read the notes below. If not, take this magazine and return it to the Executive Office of A.S.M.T., Medical Center Building, Lafayette, Louisiana, from which point it will be mailed to some interested person.

In this year of 1949, we, as Medical Technologists, shall not accomplish all we wish as a scientific group, nor will we be able to build Medical Technology in the minds of the medical profession and lay public as a profession in its own right, unless WE recognize certain problems, and unless WE put forth prodigious efforts to overcome those problems. Each individual and bit of concerted effort helps.

1. Have YOU studied how a possible national law concerning *compulsory* health insurance would affect individuals, or US as members of a profession? Have YOU *voluntarily* given yourself this form of protection? To what can national legislation of this type lead?

2. Have YOU considered carefully the question of medical technologists being licensed as such in each state? How necessary is state licensing in view of a national certifying Board? Did YOU read carefully Dr. L. G. Montgomery's letter with your renewal blank this year? This letter carries with it many interesting notices and again proves the wisdom of not acting impulsively.

3. What is the status of the medical technologist in your place of employment? Does the personnel department recognize the value of credentials certifying that you have fulfilled certain requirements which place you in a category with other professional people? And do you treat your position as a profession rather than as just another "job"?

4. Are YOU on the lookout for such fallacies regarding employment in our profession as was published in a recent popular "women's magazine"? How can YOU help to counteract such mis-information?

5. What are YOU doing as an individual or as a member of your local or state society to encourage young people to enter the field of Medical Technology, and to give them the information as to what course to follow? Or do you feel that responsibility is somebody else's?

6. Do YOU read the Editorial section and sections on News and Announcements, and State Societies in the AMERICAN JOURNAL OF MEDICAL TECHNOLOGY? These sections are written for YOU.

The above problems and others mentioned from time to time in the journal have been brought to our attention by members of the local, state, and national societies of medical technologists. The journal tries to give you as much information as possible on matters concerning medical technology as a profession. Try reading the journal through. Each issue contains informative committee reports, as many announcements of refresher courses as we are able to find, and other matters of interest to medical technologists. Not infrequently we are asked questions which have already been answered on the pages of the journal. The journal staff is inadequate to reply to these inquiries individually, and if YOU would read the journal, you might likely find the answer to your questions. READ YOUR JOURNAL.—R. M.

THE ROLE OF FUNGI IN INHALANT ALLERGY*

REVA LEVIN, *c/o Dr. Leon Unger, 185 N. Wabash Ave., Chicago, Ill.*

It has been common knowledge for many years that pollen grains, when inhaled by sensitive patients, cause hay fever, asthma, and other allergic manifestations, but it is only during the past few years that allergists agree that the inhalation of mold spores may also produce similar allergic symptoms.

The fungi in which we are interested are not related to the fungi causing infections, or even to an allergy secondary to an infection, but rather the so-called non-pathogenic soil fungi. The spores of these fungi behave exactly like pollen grains in that they produce allergic irritation when inhaled without growth or reproduction in the tissues of the host.

Mold growths are extremely wide-spread. The soil is the most common habitat for molds. Soil fungi play a prominent part in the decomposition of proteins and other organic matter, returned to the soil in plant residues. Most of the common forms such as alternaria, hormodendrum, helminthosporium, penicillium, asper-

* Paper presented before ASMT Convention, June 1948.

gillus, fusarium, and the mucorales are thus widely distributed.

Other sources of air-borne molds are plentiful. For example: mildew of textiles is generally due to various species of aspergillus or penicillium introduced in raw material during the process of manufacture or acquired in exposure to air in damp environments. Awnings, tents, draperies, window shades, wallpaper, and the canvas beneath it may furnish mold growth in damp districts.

Upholstered furniture, especially that containing kapok, and mattresses which may contain raw cotton, furnish excellent habitats for mold growth, colored stains in raw cotton may be due to fusarium, hormodendrum or aspergillus; tethering or loss of strength may be due to aspergillus fumigatus, hormodendrum, stemphylium, chaetomium and penicillium. Since either of these phenomena cheapens the quality of cotton it seems logical that the cheaper grades of cotton generally used in bedding or upholstery may contain much infested material from the raw product.

Wool may be a source of penicillium and aspergillus. Manila hemp may deteriorate from aspergillus.

Common bread mold, monilia sitophila occurs in bakeries and in many homes. It produces very fine spores in abundance and may be a potent allergen.

Luggage, shoes, gloves and other foods may become heavily molded and produce great numbers of spores. Penicillium is commonly encountered.

Plants may also be infected with fungi. These may be important in the agricultural areas, especially in the major grain belts, and certain urban districts where much grain is handled as in grain elevators, flour and feed mills and so on. Alternaria is especially important in this connection.

There are two commonly recognized methods of analyzing the air for mold identification. One is the pollen slide method. In this method the common microscope slide is covered with a thin film of white vaseline and exposed, as is the case in our office, on the window sill. To keep away rain there should be a board 8-10 inches above the slide. The slide is exposed for 24 hours. The pollen and mold spores falling through the air are caught on the slide and may be examined unstained. The count consists of the number of pollen and mold spores seen under the low power field of the microscope in five trips across the shorter side of an ordinary slide. The original idea that this number approximates the number in about a cubic yard of air has been shown to be inaccurate, but the method has been accepted by most workers. Unfortunately only a few forms can be recognized by spores or mycelial fragments. Some of the molds which can be recog-

nized by this method are alternaria, hormodendrum, helminthosporium, rusts and smuts.

The culture plate method has been the basis of most studies of air-borne molds. In this method a petri plate containing Sabouraud's agar is exposed in any particular environment such as a cellar, a patient's room or the outside air. The plate may be exposed anywhere from 2 to 15 minutes. The types and numbers of colonies are then identified both grossly and microscopically.

Areas with most moisture have most molds and mold sensitivity. In dry spots molds are of much less importance; this may explain the great improvement which some patients experience when they move to Arizona or New Mexico. Dampness, however, is not absolutely essential to mold growth as shown by the large numbers of mold spores in the middle west.

Molds are similar in action to pollens in that symptoms are directly proportional to the number in the air. When the count is high, clinical symptoms are usually aggravated. Molds also have seasonal variations, although mold seasons are apt to be much longer and to vary than pollen seasons do from year to year. Mold spores, like pollen grains, are light and small and wind-borne and carried for long distances.

In recent years the clinical importance of alternaria, hormodendrum, helminthosporium, aspergillus, penicillium, and many other varieties of molds has been shown. Of these the alternaria spores are probably the most important in the U. S. They have been called the ragweeds of the fungus family. Alternaria has a particular affinity for wheat or grain and is especially abundant during the last two weeks of July, between the grass and ragweed seasons, but is in the air all summer and to a slight degree even in winter.

Hormodendrum ranks second to alternaria in high counts and frequency of occurrence. Aspergillus fumigatus is also of great importance because of its affinity for kapok and other material commonly used for stuffing mattresses.

In our office we test for 15 different molds by both the scratch and the intra-cutaneous methods, and we treat with a mold mixture containing 50% alternaria, 30% hormodendrum, and 20% of a mixture of all the other molds with very satisfactory results.

There are two generally accepted methods for the preparation of mold extracts. In the first method, molds are grown on a liquid media for 10 to 20 days at room temperature. The liquid media is then decanted, the pellicles are pulled out of the flasks with forceps and covered with 95% alcohol for 48 hours, the alcohol is poured off through filter paper. The pellicles and the spores are allowed to dry and then are ground with a mortar and pestle. The dry powder thus obtained is suitable for scratch

testing. A liquid extract may then be made by using 1 gram of mold to 20 cc. of dextrose-phenol solution. This is a 5% extract and may be diluted to any desired strength for intradermal testing or treatment.

The second method, which by the way is a much simpler one and the one we use in our office, is adapted from one given to us by Dr. John M. Sheldon from the University of Michigan. Several Petri dishes containing Sabouraud's medium are inoculated with mold spores. When the molds have reached maximum sporulation, the growths are covered with ether. This is allowed to evaporate. Care must be taken to be sure that the room is well ventilated.

If the growth is heavy, 15 cc. of Dextrose-Phenol solution are added and allowed to extract for 48 hours. If the growth is light, smaller quantities of the extracting fluid are used. The petri dishes are frequently agitated to be sure that all the spores are suspended in the solution. The extract is filtered through filter paper, Seitz filtered, and tested for sterility. It is arbitrarily called a 5% extract, and it yields a fairly uniform nitrogen determination. The 5% solution is used for scratch testing and the 1:1,000 dilution is ordinarily used for intradermal testing.

We are at the beginning of our study of allergy to fungi. We know a little, but a great deal remains to be learned. Mold allergy is a very important branch of the whole field of hypersensitivity.

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PROTHROMBIN TIME TEST*

By W. J. SIEBERT, M. D.
Pathologist—St. Elizabeth's Hospital, Belleville, Ill.

The extended use of prothrombin time tests has made it imperative that a simple, rapid, inexpensive bedside method for prothrombin time determination be available.

Because of difficulty in obtaining and the expense and inconvenience of commercial thromboplastin, a simple readily avail-

* Reprinted by permission from St. John's Tech-knowledge, Springfield, Ill.

able source of thromboplastin from rabbit lungs is described. The method is as follows:

Fresh rabbit lungs are finely disected with a sharp pair of scissors and approximately 1 cc of normal saline per gram of lung tissue is added. (Average rabbit lungs weigh approximately 10 grams, necessitating about 10 ccs of saline.) The petri dish is then covered, and each 15 minutes for a period of about 2 hours, the mixture is stirred. It is then filtered through Whatman No. 42 filter paper, adding 1 cc of saline to the filter in order to facilitate filtration.

Approximately 5 cc of pinkish fluid is thus obtained. This is apportioned in 0.1 cc quantities by pipetting into the bottom of small test tubes. Ordinary Kahn tubes are suitable. The tubes are corked and placed in the refrigerator, at approximately 40 to 50° F. Freezing does not destroy the activity but actually preserves activity for as long as a month.

A control test is performed every few days, usually on one of the laboratory staff. The test is performed as follows: Exactly 1 cc of venous blood is obtained, and as quickly as possible, this is ejected into the bottom of the Kahn tube containing the 0.1 cc of rabbit lung thromboplastin mixture. The tube is previously warmed by simply holding it in the palm of the hand. The tube is inverted several times to insure good mixture of the blood and Thromboplastin. The tube is then tilted every two seconds by the stop watch until the blood no longer flows along the side of the tube. Agreement as to the starting point and the end point between laboratory technicians is attained with little difficulty. There should not be more than one or two seconds difference in the time recorded by several technicians performing the test on the same blood. The starting point of the time recording should be the moment that the 1 cc of venous blood is all in the test tube. The results are reported in percentage of normal as follows:

$$\frac{\text{Time in seconds of control}}{\text{Time in seconds of patient}} \times 100 = \text{percentage of normal prothrombin time.}$$

The ideal prothrombin time of the control should be 30 to 40 seconds. If the time for the lot is less than twenty seconds it should be diluted with an equal amount of saline, which usually brings it past 30 seconds. If the time is over 50 seconds the batch is discarded and another made.

If the tubes containing the 0.1 cc of thromboplastin are kept frozen there should be no change in the prothrombin time for at least three weeks.

This method is an excellent method for bedside follow-up tests.

THE MEDICAL TECHNOLOGIST IN THE FIELD OF VETERINARY SCIENCE

By AGNES HILDEN, M. T. (ASCP) *Reno, Nevada*

You may ask as I did when I was first approached about working in the veterinary field, "Is there a place for a technologist there?" However you may not have the same vivid picture of Otto, the veterinarian's helper, a rather slow man of 250 pounds who helped with the horses and cattle, which became sick on our farm at home. Otto always came to the house demanding boiling water and many clean towels. How I could fit into that picture was a bit of a mystery but a sufficiently intriguing one to make me change from a strictly hospital laboratory position to one in the Department of Veterinary Science at the University of Nevada. As technologist there, I found myself in a laboratory with good equipment, unlimited reference material, and time enough to study the references.

Part of my work is to keep up a supply of media for both aerobic and anaerobic cultures. Many of the diseases of domestic animals are caused by anaerobes and some of these are very exacting in their nutritional requirements. For instance, Clostridium hemolyticum requires a Brewer's broth made from liver richer in tryptophane than the ordinary type found in the meat market. For a while, we had 7 stock cultures of this organism, but one almost always refused to grow while the others showed good growth in 16 hours. Many times we have found that fresh media will make the difference between success and failure in producing growth when no other differences are apparent.

Another phase of my work is to do agglutination tests for Brucellosis of cattle. I was quite worried as to how I could manage to set up three or four hundred of them in a day. However, after practicing on a smaller number, I found it very easy. I must confess that a centrifuge with a sixty tube head and a pipetting machine had a good deal to do with the ease of the job. Occasionally, one of the Bureau of Animal Industry veterinarians will bring in a can of about 30 tubes and remark, "Be careful of these. Each tube stands for $2,000.00." It is quite a comfort to know that the serum keeps long enough to do a check test if one suspects a failure in technique at a time like that.

One day, when I was first in Nevada, I was called to witness a post mortem examination on some baby chicks that had been brought to us for diagnosis. I was horrified at the prospect of having to destroy them in a gas chamber. Chickens of certain ages are inclined to have different diseases. For instance, baby chicks a few days old are likely to have white diarrhea or pul-

* Read before A.S.M.T. Convention, June, 1948.

lorum disease. These chicks have a particularly monotonous cry, which is continuous, and they stay under the hover or the hen. Upon opening the body cavity, gray lesions are often found in the lungs and liver. Cultures of the liver in heart infusion broth enriched with 0.1% glucose will usually reveal a small gram negative rod, which has cultural characteristics of Salmonella pullorum.

When chicks are about five weeks old, they are apt to develop coccidiosis, a protozoan disease of the intestinal tract. There are several species of these protozoan parasites that are found in different parts of the intestine, but many of them are not pathogenic. Eimeria tenella is the one which invades the wall of the ceca and often produces hemorrhages. Often the greater part of a flock of young chickens may die from this disease.

As chickens grow older, they are less susceptible to coccidiosis, but they develop a variety of other diseases such as avian tuberculosis and fowl paralysis. These are diagnosed from the post mortem appearance of the organs and the nerves of the thighs.

When an owner submits a bird for diagnosis, it is well to ask him the clinical history because that may give the technologist the best clue to the trouble. The statement is often made that the veterinarians have the advantage over the doctors because their patients can't lie to them. However, it is surprising what the owners can do. A common lie of the poultryman is that his chickens are kept in clean quarters in spite of the dirt on their feet and feathers.

One afternoon, when the secretary and I were alone, an owner brought in a dead young chicken. I obtained the clinical history and decided to surprise Dr. Records by performing the examination. The chicken was of the white diarrhea or coccidiosis age and I was certain that I could do the right examination for either of those. Much to my chagrin, it was neither! Finally, as a last resort, I opened the gizzard and found a roofing nail. I could breathe again, as a nail in the gizzard could cause death. It was a long time before I opened another bird without the doctor in the next room.

The diagnosis of poultry diseases is usually more involved than merely finding a nail in the gizzard. Practically every known laboratory technique is used in diagnosing diseases caused by poor nutrition, specific bacteria, filtrable viruses, fungi and parasites.

Imagine yourself after being trained exclusively in human blood work confronted by a blood picture such as is presented by canary blood with Plasmodium. Needless to say, I was dumbfounded! This particular smear was made from the heart blood

of a canary, which had died during the night. After consulting the authorities, I found that avian erythrocytes were normally oval with an oval nucleus. The polymorphonuclear leucocytes are called heterophils. There are also eosinophils, basophils, monocytes and lymphocytes present.

In counting avian blood a special diluting fluid consisting of phloxine, formalin and Ringer's solution is recommended. After a dilution of 1:200, the pipette is refrigerated for 24 hours and then counted. In the chicken the hemoglobin range is 8-16 grams with an erythrocyte count of 1-4 million. The leucocyte count ranges from 10-38 thousand.

Although bloods of animals vary somewhat from the blood of humans, the differences are not as striking as in this avian blood. Erythrocytes vary in number and size. The normal count for horses and cattle is about 6-7 million whereas the normal count for a goat is 10 million. The erythrocytes are all smaller than those of the human but those of the goat are the smallest. The leucocytes show some variation in both nuclei and cytoplasm with the most conspicuous variation in the size of the granules of the eosinophiles and basophiles. Horse blood is much more viscid than that of other domestic animals. An even thin smear of horse blood is almost impossible to prepare unless a minute amount of methyl alcohol diluent is drawn into the pipette first.

You may be interested in seeing some blood smears from an experimental case of anaplasmosis, a protozoan disease of cattle. Young animals usually have a mild attack but older animals usually have a severe one. Animals of all ages may recover and be carriers for the rest of their lives. In the acute stage of anaplasmosis there are many anaplasma bodies to be seen in the erythrocytes and the hemoglobin and the red count have dropped to about half. In the early convalescent stage the presence of anisocytosis as well as nucleated red cells and an increase in leucocytes are typical of the disease. Clinically the animal had lost weight and her mucous membranes were icteric. She was given a transfusion of 500 cc. from another bovine. Her recovery following the transfusion was very rapid.

Although all domestic animals are susceptible to intestinal parasites, sheep are particularly so. On flotation with saturated sodium nitrate, we have found ova from stomach worms, lung worms, whip worms and thread-necked strongyles in the same fecal sample. If the infestation is heavy, the animal will be in poor flesh and may die.

For the first two years I worked with the department, we produced anti-serum for bacillary hemoglobinuria or red water disease. This is a hemolytic disease of cattle and sheep caused by Clostridium hemolyticum. At that time we used two serum

horses. The antitoxin titre was increased by giving the horses the toxin from a 16-hour culture in liver digest broth increasing the doses over a period of weeks. One morning, when the horses were to be injected, I was not particularly busy so I went with the veterinarian to the farm. That morning one of the horses went into shock. He began by shivering so violently and perspiring so profusely that he fell to the ground. In order to save the animal's life, it was necessary to give it a large dose of adrenalin intravenously.

After the titre was high, the horses were bled. The serum was collected and that from three or four bleedings mixed and phenolized. It was then clarified and filtered through a sterile Bueckner filter and bottled in 500 cc. bottles, these were labelled and refrigerated until they were dispensed to practicing veterinarians. Our deparment has now stopped producing the anti-serum because one of the biological supply houses is now marketing an effective one. However, their anti-serum is sent periodically for an antitoxin check test against our stock cultures.

Technicians in the veterinary field have had a similar history to those in human medicine. About 25 years ago, inexperienced helpers were hired either for part or full time. Some veterinary science departments have no technicians; some prefer to train their own. One state department has 20 technicians with 5 holding Master's degrees, and 7 having Bachelors' degrees. In another state there are 8 medical technologists in veterinary work, one of whom is a member of A.S.M.T. Two of these women work in a mobile unit about 4 months of the year doing agglutination tests for pullorum disease on turkeys. However, a very few veterinarians hire a person with technical training unless they need someone for blood work or parasitology in a large hospital. I sincerely hope that those who are working in the veterinary field have found the work as interesting and varied as I have in Nevada.

NOTES ON THE PREPARATION OF WRIGHT STAIN SOLUTION*

By JOHN T. FITZGERALD

From the Laboratories of Mercy Hospital, Portland, Maine

Wright Stain, as used today, has undergone many modifications since it was first introduced by Romanousky[1] in 1891 as a stain for plasmodia, until the technic of Wright[2] was published in 1902.

As you know, this stain consists of a dye compounded by

* Read before ASMT Convention, June, 1948.

heating methylene blue solution with sodium bicarbonate and the addition of eosin. The ensuing chemical change which takes place produces a precipitate. This precipitate is collected and dissolved in methyl alcohol. The powdered stain as supplied by commercial dye companies, and certified by the Biological Stain Commission of the Society of American Bacteriologists, assures the user of a product which is superior in refinement and uniform in quality than was available to the early hematologists; consequently, it is impractical, from an economic standpoint for hospital laboratories to attempt its manufacture.

Since the preparation of this powdered stain is so well standardized we are concerned only with the technic of making the final solution by dissolving the dye in methyl alcohol.

The method for making Wright Stain solution from the powdered dye, as described in laboratory text books, states that the dry stain should be ground in a mortar before dissolving it in methanol.

In order to avoid the cleaning which must follow this procedure and to eliminate an unnecessary step in preparing this, it was decided, many years ago, to explore the possibility of making the stain without the nuisance of using mortar and pestle. Undoubtedly this has been done by other technologists, but in as much as references to this fact are lacking, the thought occurred to me that technologists generally would be sufficiently interested to warrant the presentation of the technic in use in our laboratory.

The powdered stain is added directly to the methyl alcohol in the ratio of 0.8 gram of the dye to 500 cc. of solvent. The solution is placed in a well-stoppered container and shaken vigorously by hand at least once each day for the next three days. At the end of three days, the solution is filtered through paper into a similar-sized container and is then ready for use. It will be noticed that the dye does not dissolve 100%. A small amount usually remains in the bottle. This is insignificant, and successive lots of the stain can be made in the same container without cleaning it. The time element required for the stain to stand before filtering is essential in order to obtain desired "ripening" of the stain. Proper polychroming for clear, cellular differentiation will not be secured unless the stain is throughly "aged."

With a certified dye and reagent grade of methanol (free from acetic acid) a suitable, stable, and satisfactory stain can be prepared easily and economically. It will yield uniformly dependable results, provided, of course, that the proper technic is used when smears are stained.

It may appear elementary to enumerate the factors essential to procure satisfactory results with any Wright Stain. However,

as an occasional complaint has been made against the staining quality of certified Wright Stain, the Pharmaceutical Laboratories of the National Aniline Company[3] lists four prime requisites:

1. clean slides or cover glasses
2. neutral-acetone-free methyl alcohol
3. correct reaction of the dilution water
4. proper timing of the procedure

To clean our slides, we boil them in water containing a small amount of the detergent, Haemo-sol[4] for five minutes. They are then rinsed with water and dried in the oven and may be reused many times.

We have found that Merck's Methanol (reagent grade) meets all the exacting requirements of a suitable solvent. The distilled water used is neutral to nitrazine.

The proper timing of the procedure is essential to secure the tinctorial effect which is the objective of the staining technic.

The blood smear is covered with the Wright Stain for a full minute after which the slide is further covered with distilled water, care being taken to prevent overflooding of the slide. The solution is then mixed by blowing, through a pipet, with a rotary motion until a fluorescent film is developed after which it is allowed to stand four minutes longer. It is then rinsed off and permitted to dry without blotting.

This procedure in our laboratory has proven very satisfactory in producing most excellent differentiation in blood smears.

It is interesting to note that a pint of Wright Stain solution, prepared as outlined, involves no greater expense than would the cost of two ounces obtained commercially.

SUMMARY

1. A simplified method of preparing Wright Stain has been presented. This method eliminates the grinding of the dye in a mortar, a preliminary step which is generally recommended in the formula described in laboratory text books.

2. This procedure offers an opportunity for economy. Any hospital adopting this technic of preparing Wright Stain will effect a substantial saving in laboratory expenses.

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4. Trade Name of product marketed by Meinecke & Co., New York.

HEMAGGLUTINATION

General Principles

By I. DAVIDSOHN, M. D.

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Chairman, Department of Pathology, Chicago Medical School, Chicago, Illinois

Progress in medicine is characterized by discovery of an ever increasing number of characteristic phenomena which make it possible to recognize disease entities. They could be labeled as specificities. These specificities vary according to the technics available at the time.

The following is an admittedly arbitrary list of specificities easily applicable to the growth of scientific medicine.

I. Symptomatic specificities.
   This is the most elementary type, characteristic of primitive medicine.
II. Physical specificities:
   1. Visual.
   2. Tactile.
   3. Aural.
III. Cellular specificities.
   This is the great epoch of growth based on Virchow's cellular pathology.
IV. Chemical specificities.
V. Etiologic specificities.
   1. Bacteriologic.
   2. Protozoal.
   3. Metazoal.
   4. Viral.
VI. Serologic specificities.

These are based on antigen-antibody reactions. Both parts of the reaction may be known and both may participate in the serologic tests, as is the case in the Widal test. Both parts may be known, but only one participates in the test, for instance, in serologic tests for syphilis; though the responsible agent (Treponema pallidum) is known it does not take part in serologic tests for syphilis.

Finally only one of the antigen-antibody reactors may be known, as in infectious mononucleosis, and the antigen used for diagnosis is certainly not the cause of the disease.

The medical technologist's interest in antibodies is based on the part they play in various serologic diagnostic tests. These

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include the pretransfusion tests of blood grouping and typing and the crossmatching tests, the complement fixation and flocculation tests for syphilis, the various bacteriologic agglutination tests, the complement fixation tests for amebiasis, Echinococcus etc., the heterophilic antibody tests for serum disease, and for infectious mononucleosis, the tests for cutaneous sensitization in allergic diseases, and many others. All of these tests have in common the use of or search for substances produced in response to the stimulating action of an antigen. The present consensus is that the cells of the so-called reticulo-endothelial tissues are the site of antibody production and that the antibodies are contained mainly in the gamma fraction of globulin.

The purpose of this discussion is to present a brief review of some of the basic facts involved in tests for hemagglutinins.

There are two reactors in serologic tests: the antigen and the antibody. In hemagglutination tests with which we are concerned here, the red blood cells, which carry the antigen or agglutinogen, are clumped by the antibody, the hemagglutinins. All serologic tests are similar to mathematical equations, in that a known reactor is used to detect the other which is not known. In some tests the antigen is known and the antibody is looked for, for instance, in tests for syphilis, for infectious mononucleosis, and for Rh sensitization. In other tests, the antibody is known and the antigen is searched for, for instance, tests for M and N factors, for the Rh factor, for detection of incompatible red cells in blood transfusion reactions, and the Coombs' test for Rh sensitization of the newborn infant.

In well performed blood grouping both reactors are sought. The common procedure is to test the red cells of unknown groups with serums of groups A and B. In this set-up the antibody is known and the antigen is looked for. The complete test should include the examination for the agglutininins in the serums (the unknown antibody) with red cells of known groups (the known antigen).

Natural and immune iso- and heteroantibodies

Anti-A and anti-B agglutinins are present naturally in all persons who lack the homologous agglutinogen. Their genesis is unknown. Hence the name natural isoagglutinins.

Rh agglutinins are never found naturally, but are always preceded by parenteral introduction of the homologous antigen. They are immune isoagglutinins.

Anti-M and anti-N agglutinins are not found naturally in man, except in a few isolated instances, and cannot be produced by parenteral introduction of blood with factors M and N into persons who lack these factors. For detection of the two factors in

man anti-M and anti-N immune serums have to be used which were produced in rabbits by injecting them with human blood. Anti-M and anti-N are immune heteroagglutinins.

Heterophilic antigens and antibodies

The alcoholic extract of beef heart used as antigen in tests for syphilis is not related etiologically to the causative agent of syphilis. The same holds for the sheep cells used as antigen in infectious mononucleosis, and for Proteus X 19, the antigen in the test for typhus fever. These are heterophilic antibodies, which means that they have a liking for or react with antigens which did not take part in their production.

Physical factors favoring hemagglutination

1. Thermal range of hemagglutinins.

Natural isoagglutinins react best at lower temperatures. The width of the thermal range is directly proportionate to the titer. Isoagglutinins of very low titer may be demonstrable only at ice-box temperature, those with somewhat higher titers react also at room temperature and those with still higher titers clump red cells also at body temperature.

Some immune isoagglutinins react best at body temperature, for instance, Rh agglutinins. The thermal range is also here proportionate to the titer. Hence Rh agglutinins can be detected easily at room temperature if their titer is high, but may be recognizable only at body temperature if the titer is low. Other immune isoagglutinins react best at lower temperatures, for instance, so-called cold agglutinins seen in atypical pneumonia. If the titer is high cold agglutinins may clump red cells at room and even at body temperature.

2. Space

Agglutinins of low titer can be detected more readily in a narrow test tube than on a slide, possibly because the former provides opportunity for more intimate contact of antigen-antibody units.

3. Centrifuge

Centrifuging favors agglutination, with an optimum for each type of test both as to rapidity and duration.

Agitation also favors agglutination though only within certain limits. Too vigorous agitation may break up weak agglutination, especially in Rh tests.

4. Time of incubation.

There is optimum time of incubation for each temperature and for each test. As a rule the intensity of agglutination increases with length of incubation up to a certain limit beyond which agglutination does not increase and may even decrease.

5. Diluent.

It was shown by Diamond and by Wiener[1,2] that human serum and plasma, bovine and human, albumin and mixtures thereof, and other substances, for instance, gelatin, favor agglutination of Rh positive red cells.

Factors determining results of hemagglutination tests

When reading hemagglutination tests consideration should be given to four factors: specificity, titer, avidity and intensity.

1. A specific agglutinating serum reacts only with its corresponding homologous antigen (for instance, an anti-A serum reacts only with red cells of groups A_1, A_2, A_1B, A_2B, but not with cells O or B), it is free of hemolysins, cold agglutinins, autoagglutinins, bacteriogenic agglutinins, and does not produce rouleaux.

Test for specificity of typing serum.—Equal amounts (0.25 cc.) of test serum and of 2 per cent suspension of washed O rh (Rh negative) cells are placed into each of three test tubes. One tube is incubated at 37° C. for one hour, then at room temperature for two hours. The other tube is incubated at 2° to 10° C. for one hour and is then kept at room temperature for two hours. The third is kept at room temperature for three hours. All three tubes must be free of hemolysis, agglutination and rouleaux formation.

2. The titer is the highest dilution of the serum giving detectable clumping. It may be expressed in units as the reciprocal of the fraction denoting the highest dilution of the serum. On calculating the titer the dilution caused by the addition of the red cell suspension is desregarded. The titer of the same serum depends on the technic employed. It is highest with the test-tube centrifuge method, lower with the well-slide method, and lowest with the plain-slide method.

3. The avidity is the speed with which a distinctly noticeable reaction occurs. It is not always parallel to the titer. Evaluation of typing serums should consider avidity in addition to titer.

Technic of test for avidity.—A drop of 10 per cent suspension of test cells is placed on a flat slide alongside with a drop of test serum. The drops are mixed rapidly and spread over a circular area about one inch in diameter. The slide is rotated and the

time of beginning agglutination is noted with a stopwatch. A serum of sufficient avidity will clump A_1 and B cells in not more than 15 seconds, A_2 cells in not more than 30 seconds, A_1B cells in not more than 30 seconds and A_2B cells in not more than 45 seconds.

4. Intensity is the size of the clumps judged in degrees. The following designations are used in the laboratory of Mount Sinai Hospital, Chicago: 4+ (four plus) = all red cells form a single clump; 3+ = several large clumps in a clear medium; 2+ = clumping just visible with the naked eye, clear medium not discernible; 1+ = clumping not visible with naked eye, but seen readily with microscope; +weak = small occasional clumps visible with microscope; — = no clumping even on microscopic examination.

Technic of test for intensity.—In a test setup for avidity the clumps should be not less than 1 sq. mm. in surface area after three minutes of continuous rotation.

Comparative evalution of serologic tests

The efficiency of serologic tests is measured by their sensitiveness and specificity. The former is inversely proportionate to the amounts of antibody detected: the smaller the amount of detected antibody the more sensitive is the test. There is as a rule a limit to the sensitiveness of a test. Beyond that limit is the zone of so-called false negative tests. The sensitiveness of a test is inversely proportionate to the number of false negative tests.

Specificity of a serologic tests is determined by its ability to react only in cases of immunization with the specific antigen. False positive reactions are those in which a nonspecific antigen or antibody are involved. Specificity of a serologic test is inversely proportionate to the number of false positive reactions.

Sensitiveness and specificity do not always run parallel in the various serologic tests. For example in tests for syphilis sensitiveness can be raised readily by appropriate modifications of the antigenic extract but with it goes, as a rule, a lowering of specificity. Thus a suitable balance must be struck so that maximum sensitiveness be achieved with a minimum loss of specificity. The recently introduced cardiolipin antigen promises a great advance in that direction.

Infectious mononucleosis is another example of lack of parallelism between the two mentioned attributes of serologic tests. Here the sensitiveness is fairly low; it ranges from 60 to 85 per cent of clinical disease, depending on the criteria used for diagnosis. The specificity on the other hand is 100 per cent, if both the presumptive and differential tests are used.[3] Not a single

case has been reported yet of positive differential test in any other disease than infectious mononucleosis.

How do tests for Rh antibodies compare? It is very interesting that in the condition of Rh sensitization, the sensitiveness is over 95 per cent and the specificity is 100 per cent. There has not been reported a case of Rh antibodies caused by anything else but the previous introduction of the Rh antigen. Two facts are responsible for this high quality of the tests: 1. the high specificity is due to the fact that natural Rh antibodies do not exist (in contrast to natural anti-A and anti-B isoagglutins). 2. the high degree of sensitivity is due to the introduction of human serum or plasma or bovine albumin as medium for the so-called conglutinin test.

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TECHNOLOGICAL LABORATORY DISCIPLINES IN DETERMINING VARIOUS TYPES OF DISTURBED LIVER PHYSIOLOGY*

E. L. TUOHY, B.A., M.D., FACP**

Liver testing, by laboratory methods, has been chosen as the specific subject of this panel. The following headings will list some of the reasons:

(1). The work of the liver is such that anatomical and physiological testing may be done. It is essential to life. It may suffer gross and extensive damage and still restore itself to quite normal adequacy and function. The work it does is in association with all other bodily organs and systems. These manifold duties involve nutrition and growth, desensitization and immunity, promotion of homeostatic balance and health, and many other items too numerous to mention.

The ancients sectioned the liver of dead animals to acquire or seek out horoscopic auguries; moderns invade the living liver (Silverman needles) to ascertain its structure and check every vital body fluid to find out how the liver is behaving—in a word,

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** From St. Mary's Hospital, Duluth, and the Duluth Clinic, Duluth, Minnesota.

to get an answer to that age-old salutation, "Just how is your liver?"

(2). We have had, in Minnesota, in the field of medicine, brilliant clinical research in liver disease. Professor Cecil Watson and his associates, through their exact "liver profile" studies, have given our profession practical guides with which to make earlier and better diagnosis. You are having the opportunity today of hearing from some of the expertly trained medical technologists who have worked in this field with the University of Minnesota group. We only ask you to understand that the standards of work accomplished in this specific field are a proud exhibit, indicating the type done in scores of other fields.

(3). What these men and women have accomplished has been amply reported in an ever widening medical and technological literature. Their work in hepatitis, with or without jaundice; the practical application of studies in pigment metabolism, enabling much clearer differentiations as between intra and extra hepatic biliary obstruction has been abundantly checked and confirmed. It is presented to you here today, however, not only because of its technical excellence, but for the greater reason that in the Department of Medicine at the University of Minnesota the medical technologists have been afforded full professional recognition. That means that they have not been maintained as cooperative, friendly, mechanical robots, but as scientific associates.

(4). This is important at this writing, and especially at this inspiring Convention of Medical Technologists, for reasons too obvious to need mention. Professional standing is something that is not acquired by edict. Because an undergraduate in engineering deigns to proffer his services by the hour as a baby sitter, it does not by that congenial and charitable act, give him professional status in the field. Serious-minded young people of collegiate caliber are now in this field of laboratory medical service. They have assumed decisive responsibility. They have a right to look to the doctor for guidance and cooperation in making our offices and hospitals ever safer havens of refuge from the bombardment of this "dangerous century." The surgeon who decides upon an abdominal exploration because a medical technologist has reported a high leukocyte count, or determines not to because of a reported high blood amylase, is calling upon the brains, the honesty and ethical forthrightness of an associate in the field of healing. Our whole fabric of higher technical education, and integrated teamwork becomes a deflated decorative balloon, under any less critical assessment.

(5). All instruments of relative precision need frequent checking. "Bugs" come into all our techniques and procedures; and if solutions and reagents require a review in the face of con-

flicting laboratory testimony, likewise all personel connected with research and vital decisions in terms of human life should not resent similar checking. No one could have checked himself more meticulously than did the great Pasteur. For our laboratory associates the field of liver disease affords us one of the best for cooperative and associated clinical study. The reliability of a technologist in any of the diverse fields of laboratory investigation may well be checked against her case follow-ups. If there is none such, she is like the internist or surgeon who learns nothing from the post-mortem table. Confidence is gained by testing the degree of confirmation conferred by case follow-up where the doctor and the laboratory work together. Thus, if the liver checking is consistently accurate, the haematological or bacteriological techniques invite confidence and reliance.

Something in the line of very general comment and advice may not be out of place before this representative and trained group. Most of you are women. Only a few special hospitals have drawn men into your field. Therefore, at the start you must agree that a heavy fraction of your trained group falls to the lure (so necessary for the race) of marriage and the rearing of a family. Your field is romanticized and robbed of its personnel to no greater extent than other advanced professional women's groups. I refer to the issue, not to counsel you to apply D. D. T. to Cupid's pathways, but to urge you to retain and sustain your interests in your work after marriage. I have known a number of superbly fitted women where later in life widowhood or general insecurity have found them conspicuously favored in retaining their skills and availability. They have found a degree of comfort and usefulness, based not only on their earlier training and close understanding of doctors and their personality quirks, but upon their own firmly footed independence and reliability. The field is not going to be outgrown by any development. It is here to stay and enlarge. This extension of laboratory medical disciplines leads your members into a position where you must absorb and share the headaches that complicated specialism and organization have bestowed upon our guild. For example, much of your work is done in hospitals. The morning paper tells us that Johns Hopkins Hospital faces a $900,000.00 deficit. Few hospitals and medical schools face balanced budgets. It was reported also, within the month that in New York a group of hospitals face an issue of daily hospital costs of nearly $15.00 and a supporting budget of something less than $12.00. It was suggested (Latin American and Irish sweepstakes custom) to establish a lottery to pull the hospitals out of the red!

Some hospitals will separate you from the volume of work which alone makes you exact and skillful, and put the unit cost

of procedure where the staff members fail fully to utilize the technologists' services. Your techniques must frequently show their worth where they may not be essential for the specific patient, in order that in complicated, borderline and confusing diagnoses, your beneficent weight may balance the diagnostic and therapeutic scales. Dr. F. J. Hirschboeck, in this program today, will illustrate more fully this hospital and clinic staff issue. Doctors, nurses, technologists—everyone connected with our hospital, whether as personnel or patient—must keep a sympathetic attitude toward whatever management governs and guides the institution. A portion of your professionalism must be reflected in considerable degree by what you do, not strictly in the line of duty, but in that spirit of service that in contrast shows up the hireling for what he is. The sheep do seem to need a lot of shepherding.

Through all of your work, whether in private or public institutions, clinics or research laboratories, you may never overlook the central idea of keeping your interests focused upon the *whole personality problem* of the individual seeking medical aid. There is a rapidly accumulating awareness that "tests for organic disease" have absorbed too much of our attention. Even excluding the issues involved in perverted physiology, there still remains that great and mostly uncharted panel made up of the "psychosomatic." You will meet up with legions of them. Do not brush them aside as useless timber as you view the daily pile of mounting sawdust. Many good people are ill who do not show demonstrable pathology. Many of you may be in the psychosomatic group; some day we may have laboratory tests to better classify them. Help us to develop these tests, or at least to retain the human touch.

CORRELATION OF SOME LIVER FUNCTION TESTS WITH SERUM PROTEIN FRACTIONS

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Before the topic of the correlation of certain liver function tests with specific serum protein fractions can be discussed, it is necessary to review briefly recent developments in the field of plasma (or serum) protein chemistry. The well-known differentiation of plasma proteins into albumin, globulin and fibrinogen fractions remains valid, but such a classification is now known to be incomplete. Modern methods of analysis have shown that globulin is composed of at least three distinct fractions, alpha-, beta-, and gamma-globulins. These three globulins differ from each other chemically (for example in molecular weight and solubility) as well as in physiological activity.

It has long been recognized that advanced states of liver disease are accompanied by increases in the amounts of globulin in the serum. Of the many tests which have been used to detect liver diseases, three which are known to depend on abnormalities in serum protein composition will be discussed here. These are the cephalin cholesterol flocculation test of Hanger, the thymol turbidity test of Maclagan, and the colloidal gold test.

I. Cephalin-Cholesterol Flocculation Test

All the investigations on the mechanism of this test since it was introduced by Hanger in 1939 have agreed that gamma-globulin is the serum protein fraction which is primarily responsible for a positive test. However, it has been adequately demonstrated that the gamma-globulin isolated as a pure fraction from normal serum as well as from serum of patients with certain hepatic dysfunctions (for example, infectious hepatitis) give a positive test. A study of the mechanism of the cephalin flocculation test revolves around two problems: (1) the cause of a positive test in some cases of liver disease, and (2) the cause for a negative test in normal as well as in many pathological sera.

Without attempting to cover the experimental data, the following summary is offered of tentative conclusions drawn from the work of several investigators in the field. Each statement is supported by experimental data, but some of the points require confirmation or extension to a larger series of cases. 1) The gamma-globulin of positively-acting serum is more active per unit weight than is that of negatively-acting serum. 2) The alpha- and beta-globulins of positively-acting sera are active in causing flocculation whereas similar fractions of normal sera are without effect. 3) Albumin from both positively- and negatively-reacting sera have an inhibitory action on flocculations. It has not been definitely demonstrated that the albumin of normal serum has a greater inhibitory effect than has the albumin of positively-acting serum. In fact, the ratio of the amount of normal albumin required to inhibit the action of normal gamma-globulin is much greater than occurs in normal blood.

One may sum up the evidence on the cephalin-cholesterol test by saying that there is adequate explanation for the flocculation in positively-acting sera, but no evidence is at hand to explain the lack of a positive test in normal sera.

II. Thymol Turbidity Test

There is unanimous agreement among the investigators on the mechanism of the thymol turbidity test that the lipids of the serum are involved in the reaction. For example, if the lipids are removed from sera which had previously given a positive

test, the test now becomes negative. If such lipids as cephalin or cholesterol are now added to this serum, activity is restored. Furthermore, the intensity of the thymol turbidity reaction of a positively-reacting serum can be increased by adding increasing amounts of lipid. Similar additions of lipid to normal sera do not cause the development of turbidity. One may conclude, then, that the presence of lipid in serum is not the essential factor for the test, although it does play a part in the reaction.

As in the cephalin flocculation test, gamma-globulin has been shown to be responsible for the thymol turbidity test. The gamma-globulin of both normal and positively-reacting sera appear to be equally active in causing turbidity. Normal albumin inhibits the reaction of gamma-globulin in amounts comparable to those found in normal serum, whereas the albumin from positively-reacting serum has little inhibitory effect. This affords an adequate explanation for the absence of thymol turbidity in normal sera.

Thus the thymol turbidity test appears to be simpler in mechanism than is the cephalin flocculation test, involving as it does only the albumin and gamma-globulin fractions, without participation of alpha- and beta-globulins.

III. Colloidal Gold Reaction

This test has been applied more extensively to the study of cerebrospinal fluid than to that of serum, but its mechanism appears to be similar to that of the cephalin flocculation and thymol turbidity tests, so will be briefly summarized.

(1). As in the two tests previously discussed, the gamma-globulin isolated from both normal and positively-reacting sera gives a positive test, with the latter being somewhat more active than the normal.

(2). Albumin from either normal or positively-acting sera has a negligible inhibitory effect on the reaction. (Where the ratio of albumin to gamma-globulin is much greater than occurs in serum, inhibition by albumin occurs.)

(3). The alpha- and beta-globulins of both normal and positively-acting sera inhibit the action produced by gamma-globulin. The ratio of inhibitor to flocculator in normal blood is somewhat greater than that which has been found necessary to inhibit the action so that the normal negative test can be explained. On the other hand, the ratio of alpha- and beta-globulins of positively-reacting sera required to inhibit the gamma-globulin activity is greater than is likely to be present to such sera, thus accounting for the positive reaction.

In conclusion, one can only emphasize the great complexity of the three reactions. They bear the common feature of depend-

ing on gamma-globulin as the active factor. The nature of enhancing and inhibiting factors varies from test to test, so that it is understandable that individual sera may react differently in different tests, an observation which has been reported by clinical investigators.

"PROCEDURES AND PROBLEMS INVOLVED IN PERFORMING TESTS FOR BILE PIGMENTS AND LIVER FUNCTION"

MARGARET GIEBENHAIN AND VIOLET HAWKINSON

The liver has innumerable functions. A few of these are the production of prothrombin and plasma protein; the excretion of bile; the participation in protein, carbohydrate, fat metabolism, and the detoxification of foreign substances. A few or many of these functions may be disturbed by hepatic disease, depending upon the disease and its stage. Single tests are often misleading as there is a remarkable variation in function from case to case. For this reason a number of tests should be done.

Two tests for the detection of abnormal protein present in many cases of liver disease are very simple and easy to employ in any laboratory. They are the Hanger flocculation test[1] and the thymol turbidity test[2] as devised by MacLagen.

The Hanger Flocculation or cephalin cholesterol test is a test for an abnormal globulin in the presence of an abnormal albumin. The desiccated antigen may be purchased from commercial firms or may be prepared in the laboratory from rabbit brain. 0.2 cc. of serum is added to 4 cc. of physiological saline and 1 cc. of aqueous antigen is added to this. The tube is stoppered with a rubber cork, mixed, and allowed to stand at room temperature in the dark for 24 hours. If the abnormal protein is present there will be flocculation in the tube at the end of this period, the amount varying with the amount of abnormal protein. They are to be read from zero to four plus. The glassware used in this test must be chemically clean and the tubes must be kept in the dark since the test is quite sensitive and false positives will occur if these precautions are not taken.

The thymol turbidity test is a very simple test for the presence of an abnormal globulin. A thymol buffer is prepared by making a saturated solution of thymol in a barbital buffer at pH 7.8. 0.1 cc. of serum is added to 6 cc. of the buffer and the resulting turbidity is graded in a comparator block. The Kingsbury-Clarke standards for reading urine protein can be used for this determination and may be purchased commercially. A photo-electric colorimeter may also be used with the barium sulfate standard devised by Shank and Hoaglund[3] reading with a 660 filter. If a photo-electric colorimeter is used a blank of 0.1 cc. of serum plus 6 cc. of physiological saline should be used. If however,

the buffer becomes turbid, 6 cc. of the buffer itself is a better blank since the yellow color of the serum does not affect the photocell sufficiently with the 660 filter to make a significant difference in the final value. The pH of the buffer should be carefully checked since rather small variations cause a difference in the amount of turbidity.

Abnormalities of the serum proteins which can be picked up by these tests are found in cirrhosis, infectious hepatitis, homologous serum jaundice, and acute yellow atrophy. They will in most cases help to differentiate these causes of jaundice from mechanical causes such as stones and common duct structure. Frequently, cirrhosis patients may have no elevation of the serum bilirubin but at the same time have the abnormal proteins which give the positive reactions in these tests. It is advisable to do both of these tests when possible although they parallel each other in many cases. There are situations in which one or the other of the tests may be negative since the reactions are caused by different protein fractions.

The total cholesterol and the percentage of cholesterol esters are also of value in the study of liver disease. The total cholesterol is elevated in cases of biliary obstruction and is sometimes very low in cases of cirrhosis. The percentage of cholesterol ester, however, gives the greatest amount of information in most cases of liver disorder. In cases of cirrhosis, hepatitis, and acute yellow atrophy, for example, the percentage of esterified cholesterol is lowered. As the patient with infectious hepatitis recovers and the functioning of the liver improves, the percentage of cholesterol esters rises until at last a normal percentage is again found. The Schoenheimer-Sperry[4] method for determining total cholesterol and the percentage of cholesterol esters is based on the reaction of free cholesterol with digitonin. Cholesterol esters will not form the digitonide.

To determine the total cholesterol and the ester fraction by this method, 1 cc. of serum is extracted with 25 cc. of a mixture of absolute alcohol and acetone. Two aliquot portions of this extract are treated separately with aqueous digitonin. In one portion the cholesterol esters are hydrolyzed to free cholesterol with potassium hydroxide in a 37° incubator. This portion will yield the value for the total cholesterol. The second portion is treated directly with digitonin. This portion yields the value for free cholesterol only. The cholesterol esters are equal to the difference in the two values. The digitonin precipitate must be washed with mixtures of acetone and ether and finally with ether so that the cholesterol esters are removed from the tube testing for the amount of free cholesterol and so that no water remains in the tubes at the time of color development. The digitonide precipitate is dissolved in glacial acetic acid and a green

color is developed by adding a mixture of acetic anhydride and sulfuric acid. Determining the total cholesterol as cholesterol digitonide has two advantages. First, the substances other than cholesterol which may give the final color reaction are eliminated and second, cholesterol esters give a more intense color reaction than free cholesterol and therefore when the esters are not hydrolyzed higher values are obtained.

If values for just total cholesterol are desired Bloor's[5] method is very satisfactory and is more simple than that of Schoenheimer-Sperry. Serum is extracted with alcohol and ether and the liquid portion is decanted from the protein. The alcohol and ether are then evaporated and the residue is redissolved in chloroform. The color is developed in the chloroform with acetic anhydride and sulfuric acid.

It should be noted that the above cholesterol procedures employ serum or plasma from heparinized blood since plasma from oxalated or citrated blood will give lower values.

The amount of alkaline phosphatase present in the serum is also a key in the differential diagnosis of liver disease. In biliary obstruction the values are sometimes extremely high since the phosphatase cannot be eliminated through the bile as it ordinarily is. In hepatitis and cirrhosis the values are usually elevated but not to the degree that they are elevated in biliary obstruction. There are two methods in common use for the determination of alkaline phosphatase, the King-Armstrong method and the Bodansky method. These are similar as far as technique and principle are concerned but the final color reactions are concerned with different substances.

In the Bodansky method the buffer substrate contains sodium betaglycerophosphate. The phosphatase enzyme acts on this substance to release the phosphate from the glycerol and the final color reaction determines phosphate directly. In the Aleisandri and Ducci[6] modification 0.5 cc. of serum is added to 9.5 cc. of buffer at pH 8.6. This mixture is incubated for one hour at 37°. At the end of this time, the tube is cooled and the protein precipitated with 10% trichloracetic acid. This is then filtered through a phosphate free filter paper. This is called the "phosphatase" filtrate. 0.5 cc. of serum is placed in a second tube and 9.5 cc. of 10% trichloracetic acid is added to this tube with vigorous shaking. The protein is then separated by filtration. This is the control filtrate. Aliquot portions of the protein free filtrates are treated with sodium molybdate and elon in trichloracetic acid and a blue color develops. One Bodansky unit of phosphatase activity is equal to one milligram percent of phosphate freed from the glycerophosphate under controlled conditions. The milligrams of phosphate percent in the control tube

subtracted from the milligrams percent in the "phosphatase" tube is noted in Bodansky units.

In the King-Armstrong method[7] the buffer substrate contains disodium phenol phosphate. The enzyme releases the phosphate from the phenol. In this method 0.5 cc. of serum is added to 10 cc. of buffer at pH 9.3. This mixture is incubated at 37° for ½ hour. At the end of this period the tubes are inverted several times to mix well and the contents filtered through phosphate free filter paper. This is the "phosphatase" filtrate. 10 cc. of buffer are placed in a second tube and 4.5 cc. of Folin-Ciocalteu reagent is added to it. 0.5 cc. of serum is added to this mixture, the tube is shaken, and the contents filtered through a phosphate free filter paper. This is the control filtrate. Aliquot portions of the filtrates are treated with 20% sodium carbonate and a blue color develops. The amount of enzyme present is expressed in units, one King-Armstrong unit percent being the activity required to liberate one milligram of phenol under the conditions of the test.

In these tests for phosphatase activity it is very important that the standard conditions be rigidly observed, i.e. the incubator temperature, the pH of the buffer substrate, and the length of time of incubation. The enzyme activity varies if these conditions are not well controlled.

Another test of liver dysfunction is the intravenous bromsulfalein test. This test measures the ability of the liver to remove bromsulfalein dye from the blood stream. Normally 0 to 5% of the dye is retained in the blood stream 45 minutes after the injection of five milligrams of the dye per kilogram of body weight. In liver disease the organ is unable to handle the dye and a greater percentage is retained. The estimation of the percentage of dye retained according to the method of Gaebler[8] is very easy to do. Just before the injection of dye a control sample of blood is drawn. Two cc. of this serum is diluted to 10 cc. with physiological saline and one drop of 20% sodium hydroxide is added. This tube is used as a control. Two cc. of the serum which is withdrawn at the end of 45 minutes is treated in the same manner. Bromsulfalein, which is an indicator, is violet in an alkaline solution. The unknown is read with the 580 filter using the fasting control as a blank. The calculation of the percentage of dye retention presupposes the presence of a normal blood volume. The test may also be read in a visual comparator block which may be obtained from commercial firms.

A study of the bile pigments also gives a good deal of information about the status of the liver. Bilirubin is constantly being formed from the pigment fraction of destroyed hemoglobin and is carried to the liver where it is excreted into the bile. The normal concentration of bilirubin in the serum depends upon

a balance between the rates of formation and elimination. This value has been found to be below 0.2 milligrams percent for the one-minute direct reacting bilirubin and 1 milligram percent for the total bilirubin. An elevation of the prompt reacting bilirubin indicates extra-hepatic or intra-hepatic regurgitation of bile into the blood stream such as is found in cases of biliary obstruction. An elevation of the indirect reacting bilirubin indicates hepato cellular inability to handle bilirubinglobin. This is found in cases of increased hemolysis or hepato cellular injury.

Direct reacting bilirubin gives a red-purple color with the van den Bergh diazo reagent and the delayed reaction is brought out by the addition of alcohol. This test has been quantitatively established by Malloy and Evelyn[9] and modified by Ducci and Watson.[10]

The icterus index may also be used as a measure of jaundice. This, however, does not give true values when yellow substances are present in the serum or when much delayed reacting bilirubin is found. A yellow color of the serum may be due to caratine or a chemical such as atabrine.

In very early cases of hepatitis, the renal threshold for the one-minute bilirubin is very low and bilirubin spills over into the urine. Bilirubinuria may be tested for by the use of fuming nitric acid or the modified Harrison spot test.[11] The Harrison spot test is especially sensitive. It employs the use of strips of thick filter paper impregnated with barium chloride. These strips are dipped into the urine and the pigment collects on the filter paper at the surface of the urine. Fouchet's reagent is then dropped on this zone. If bilirubin is present it is oxidized to biliverdin by the Fouchet's reagent giving a green color. A concentration of bilirubin as low as .05 mg.% will give a positive test. The amounts may be read semi-quantitatively from a color chart.[12]

The methylene blue test[13] for bilirubin in the urine is also of value as a screening test for liver disease.

One of the most sensitive tests for liver cell damage is the increase of urine urobilinogen. This substance is a reduction product of bilirubin and is formed mainly in the colon by the action of bacteria. Bilirubin is first reduced to mesobilirubinogen and then to stercobilinogen. A part of it is then reabsorbed and returns to the liver, the rest of it is excreted in the feces. Under normal circumstances, the reabsorbed fraction is disposed of by the liver and not more than 3 milligrams per day escape into the urine. If the liver cell is even slightly damaged it is unable to handle the urobilinogen which is then excreted in the urine.[14, 15]

In the test for urobilinogen in the urine 2.5 cc. of urine are pipetted into each of two colorimeter tubes. If the urine contains a lot of urobilinogen, a 1-10 dilution should first be made. 2.5 cc. of Ehrlich's reagent are added to the first tube, the contents are

mixed, and immediately 5 cc. of a saturated aqueous solution of sodium acetate are added. To the other tube, which is to serve as a blank, the reagents are added in reverse order to prevent color development. First the 5 cc. of saturated sodium acetate are added and the contents thoroughly mixed and then the 2.5 cc. of Ehrlich's reagent are added. The first tube may then be read on a photo-electric colorimeter at 565 mu. using the second tube as a blank for the center setting, or they may be read on a comparator block when a colorimeter is not available. Values above one Ehrlich unit per two hours are regarded as abnormal. The main precaution to take in running the test is to be sure the sodium acetate is saturated; otherwise the maximum color will not be developed and color will be obtained in the blank.

Using the Wallace and Diamond[16] test for urobilinogen, the values are recorded as greatest dilution giving a positive test. The test is very easy to run and the main problem involved is making color comparisons when slightly abnormal results are obtained. A quantitative urobilinogen determination should be run on a 24-hour specimen if much bile or porphobilinogen is present. This involves extraction with petroleum ether and the red color obtained is specific for urobilinogen.

A stool urobilinogen determination gives the clinician an idea of how much urobilinogen is being reabsorbed from the colon, or in cases of biliary obstruction, how much bilirubin actually gets into the gut. A stool Ehrlich is of considerable value in differential diagnosis in cases of obstruction and also in determining increased hemolysis.

Normal values as obtained by the petroleum ether extraction method are 40-280 mg./da.

Another very sensitive test for insipient liver damage is the determination of coproporphyrin. Porphyrins are red pigments which are composed of four pyrolle nuclei connected by methine bridges. Coproporphyrin is found in small amounts (below 100 gamma) in the urine of normal people. Increases are regularly found in regurgitation jaundice and also in cases of liver disease without jaundice. In a recent study of latent hepatitis cases, the coproporphyrin value was one of the last things to return to normal after the disappearance of jaundice. The coproporphyrin determination, however, is a rather long extraction process and involves quantitating fluorescence and for this reason it is not feasible to run this procedure in a routine laboratory.

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PARASITE PROBLEMS IN VETERANS

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During World War II American forces were sent to every part of the world and one cannot name any exotic parasite, even among those with very limited geographic distributions, in whose endemic areas there were not at least a few Americans. It is a tribute to the precautions employed by the Army and Navy that parasitic diseases are not far more abundant among veterans. Nevertheless, the variety and incidence of parasitic diseases among veterans of overseas service is far higher than among non-veterans.

The dangers of introduction and spread of exotic parasites in this country have been considered by many authors but logic and our post war experience so far indicate that these dangers are slight and the problem is largely one of diagnosis and treatment of the individuals affected (Matheison, 1947). As, with a few notable exceptions, diagnosis of a parasitic infection rests on the visual recognition of the parasite, the alertness and skill of the technologist are of the highest importance with this group of diseases.

The relative probabilities of encountering certain parasites may be estimated. According to Simmons (1947) there were 460,872 cases of malaria in the Army, while Sapero (1946) states that there were 572,950 recorded cases in the Army and Navy and estimates that if all had been recorded there would be about 1,000,000.

The author is unaware of any similar comprehensive data on the incidence of amebiasis, but experience in the Army and at the Veterans Hospital indicates that it is considerably higher

among veterans of overseas service than among non-veterans, for whom an incidence of 10 percent or more is usually given, though our local experience suggests that it is less than 3 percent.

Filariasis with 2,151, Schistosomiasis with 1,636, and Leishmaniasis with 307 Army records of infection (Simmons, 1947) are examples of exotic diseases less commonly found and, while total infection rates are very small, correct diagnosis in the cases of these individuals infected is of tremendous importance. Hookworms *Strongyloides,* and *Trichuris* are cosmopolitan intestinal parasites which are long-lived and not infrequently found. Both the European hookworm *(Ancylostoma duodenale)* and the New World hookworm *(Necator americanus)* were acquired by veterans in various parts of the world but as these species are impossible to distinguish in the egg stage, we have little information on their relative incidence. *Ascaris lumbricoides,* while it is a very common helminth, is short lived and rarely seen in veterans; we have found only one case at the Veterans Hospital.

Among the infections mentioned above, malaria is outstanding, having been the most important infectious disease in the war. Because of the tendency of benign tertian malaria to relapse, it is the most common parasitic infection seen among veterans. Malignant tertian malaria, caused by *Plasmodium falciparum* rarely relapses and is completely cured by atabrin. We have seen no case within the past two years. Relapses of *Plasmodium vivax* infection usually die out in two to three years after the last exposure and during the last six months the number of positive slides we have seen has dropped very markedly.

The mechanism of the latent period and relapse in malaria is not wholly clear but the recent discovery of Shortt, Garnham, and Covell (1948) of non-pigmented tissue stages of *Plasmodium vivax* in the liver of man is an epoch-making step toward its explanation.

The well known relapsing feature of malaria leads some veterans to the unfortunate practice of self treatment of any fever with atabrin and we have seen men suffering from other diseases (amebic abscess of the liver for example) who had been taking atabrin for a supposed malaria infection. On the other hand an unexpected initial attack of malaria may appear as long as two years after the last exposure. This all leads up to the importance of the laboratory in the diagnosis of malaria because, in the appearance of plasmodia in the blood we have an accurate, simple, and wholly dependable basis for diagnosis.

The methods are well standardized and the excellent manual of Wilcox (1946) makes any detailed discussion of technique superfluous. Our practice is to make thick and thin film preparations in each case. While the combination of thick and thin films on one slide is efficient for mass production, as in surveys, we

feel that we get better results under hospital conditions by using separate slides, staining the thin films with Wright's stain and the thick film with dilute Giemsa's stain. It is important that the thin film be really thin, with only one layer of cells on the slide. The thick film must be of the proper thickness and stirred thoroughly so that there is no cracking when it dries.

We find the Field's stain, a quick method, is very satisfactory, especially when a prompt report is required, as only 6 seconds are required for staining and only 5 or 10 minutes for drying the slide. As the method does not appear in many current laboratory guides it is given in brief below, from Field (1941).

Solution A

Methylene blue	0.8 gm.
Azure I, German (or Azure B, American)	0.5 gm.
Na_2HPO_4 (anhydrous)	5.0 gm.
KH_2PO_4 (anhydrous)	6.25 gm.
Distilled water	500 cc.

or if Azure I is not available, Solution A may be prepared as follows:

Dissolve 1.3 gm. methylene blue and 5.0 gm. Na_2HPO_4 in 50 cc. of distilled water. Boil and evaporate almost to dryness in a water bath; then add 6.25 gm. KH_2PO_4 and 500 cc. distilled water, stir thoroughly, set aside for 24 hours, and filter.

Solution B

Yellow water soluble eosin	1.0 gm.
Na_2HPO_4	5.0 gm.
KH_2PO_4	6.25 gm.
Distilled water	500 cc.

These solutions may be used almost indefinitely if kept in the refrigerator and should be filtered if a scum or sediment forms. Properly made thick films can be stained with less drying than is necessary for Giemsa's stain. The film is dipped in Solution A for 1 second, in distilled water for 2 or 3 seconds, in Solution B for 1 second, again in another jar of distilled water, and is dried in a vertical position. Some portion of the smear is always found in which there is a uniform pale creamy background against which the malaria parasites, if present, stand out beautifully.

Intestinal protozoa are more often neglected or inadequately diagnosed than any other group of animal parasites. The most important of these, *Endamoeba histolytica*, is far more common, and more frequently pathogenic, in veterans of overseas service than in untraveled Americans, as pointed out by Spellberg and Zivin (1948) and borne out by our experience. In the past 20 months we have records of 82 infections with *Endamoeba histolytica*. Of these at least 64, (information is still incomplete in some cases) including all of those with marked symptoms referable to the

Endamoeba were in overseas veterans. We are at present making a more complete analysis of these data for future publication.

As in other branches of laboratory diagnosis of parasites, success depends upon one's ability to recognize the organisms microscopically. The various techniques used do not in any degree substitute for this ability and, without it, are useless. The routine which we employ in searching for intestinal parasites involves, first, a direct wet smear in saline or 0.1 percent eosin. The latter is a background stain which does not alter the appearance of parasites but colors most other objects and makes protozoal cysts stand out conspicuously. This wet smear is the most important step and one who cannot detect a large proportion of infections with it will be little aided by other techniques. It is the only method used to detect the presence of trophozoites as they are destroyed by concentration techniques. Stool specimens or exudates suspected of containing trophozoites of *Endamoeba* or other protozoa must be examined promptly. Any delay beyond a few minutes results in their death and disintegration and the mistaken practice of keeping such specimens warm in the incubator only hastens the destruction of the parasites.

If protozoal cysts are found, additional smears, using an iodine stain, are made. A number of formulae for iodine stains, including d'Antoni's standardized iodine stain are available and give good results if freshly prepared. Except for d'Antoni's preparation these are subject to a subtle deterioration after two weeks, which is not readily detectable but gives less accurate staining of the cysts.

Of the many concentration methods available we have chosen the zinc sulphate centrifugal flotation method as it is most successful with protozoal cysts. It is applied to every specimen and increases the number of positive findings considerably.

The third technique which we use, haematoxylin staining, is usually reserved for those specimens in which protozoa have been found. While some specimens can be identified with confidence from iodine preparations it is generally agreed that hematoxylin staining is essential for confirmation, and continued accurate work is impossible without its constant use. There are numerous modifications of the classical Heidenhain's iron haematoxylin method; the one we have found most satisfactory being Diamond's (1945) tergitol—haematoxylin method.

Recognition of helminth ova presents less difficulty than the detection of intestinal protozoa. Most ova may be found either in the direct smear or the zinc sulphate concentration but the latter technique is relatively ineffective for Schistosome ova. In recent years a variety of modifications of the acid ether concen-

tration and the simple sedimentation in water have been devised but space does not permit a critical evaluation of them here.

Filariasis and schistosomiasis are two infections in which the technologist's work is likely to be disappointing. Though filariasis was contracted by some 3000 service men, the microfilariae have been found in the blood in a negligible number of these mild infections and diagnosis must usually be made on the basis of history and clinical picture. Stool examination has often been unsuccessful in the diagnosis of the relatively light schistosome infections acquired by our troops in the Philippine Islands. In the majority of parasitic infections, however, alert and conscientious work at the microscope will reveal the presence of the invading organisms and will point the way toward the treatment which the veteran deserves.

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EDITORIAL PAGE

FLOWERS TO THE LIVING

A Note of Appreciation to the Board of Registry of Medical Technologists

When I was a little girl, my mother had a corner of her vegetable garden reserved for flowers, a corner which she called "God's Acre." These flowers went to anyone in our little town who was ill, to anyone who had been in trouble, to those who had done something especially nice for someone else, to a newcomer, or to just somebody mother felt should have some. She used to say that flowers should be for the living. "Don't wait until someone is gone to say nice things about them." This made a great impression upon my childish mind. When she died, this one sentence from her funeral service stands out in my memory: "Truly she believed in flowers for the living, both figuratively and literally."

Last year a good friend of medical technologists, Dr. Philip Hillkowitz, passed away. We all regretted his going. While he was alive, I doubt if many of us voiced to him the appreciation we felt for his work in our behalf. Now another good friend of ours has left the Board of Registry—after twenty-one years of working for medical technology. Dr. Kano Ikeda has been a wise counsellor and guide to a struggling young profession. Some of us in our impatience have not always agreed with his decisions, but as we look backward, and in years ahead, we shall see that he helped lead us to the very goals we desired, but along a much safer path than our unthinking impetuosity would have done. So we shall say just, "Thank you, Dr. Ikeda, and we shall appreciate your continued counsel and guidance for many years to come."

We wish also to thank Dr. Montgomery for the splendid letter he wrote to all registered Medical Technologists with their renewals. We feel that this will do much to help enlighten those who do not already belong to our national organization as to what we are trying to do toward building our profession. We hope that every registered medical technologist will read this letter with the full understanding of what the co-operation of the Board of Registry has meant to us.

Finally, we want to assure all the members of the Board of Registry of our continued appreciation of their work in our behalf and to welcome the new member, Dr. F. B. Lynch, Jr., of Philadelphia.—L.W.

THE NATIONAL INSTITUTE OF HEALTH TERMINOLOGY FOR TYPING SERA

A Word of Warning

The purpose of this communication is to call attention to the newer labeling of typing sera recommended by the National Institute of Health. Scientifically, it is more correct than the previous terminology, but to many of the older workers, especially, it is definitely confusing. Prior to the last war typing sera were sold commercially as Types II, III, and IV (designated as Moss); then followed the Landsteiner classification using the letters A, B, AB and O to designate the agglutinogen content of a blood, and typing sera were sold by several commercial houses as Type A, Type B, and Type O. NOW ONE READS ON THE LABEL OF THESE COMMERCIAL TYPING SERA, Anti-A and Anti-B, when the sera are Group B and Group A, containing the agglutinins a and b. The terminology, Anti-A and Anti-B is that of the National Institute of Health.

Unless a laboratory worker has followed the newer trends in blood classification and groupings, and unless a salesman has pointed out the reversed meaning of A and B, and that A and B designate *agglutinogen* and NOT agglutinin content (a and b), there will be errors in typing with these sera, errors not wilfully ordained by a technologist, but errors due to the fact that the technologist, working under pressure, as usual, might not realize that Anti-A serum is Group B, and Anti-B serum is Group A. The clinical significance is that all Group A individuals may then be classified erroneously as Group B, and vice-versa.

At this writing it is expedient to point out that commercial typing sera should be checked with known A, B, and O blood. After this check, a re-labeling of the bottles with terms II-A, III-B, and IV-O, and, in parentheses, Anti-A and Anti-B, would eliminate any confusion due to this newer system used in the labeling of the typing sera. Moreover, none of the new 1948 laboratory texts suggest labeling typing sera as Anti-A or Anti-B.

—Clara Becton

AMONG THE NEW BOOKS

CLINICAL LABORATORY METHODS AND DIAGNOSIS: A textbook on Laboratory procedures with their interpretation by R. B. H. Gradwohl, M.D., D.Sc., F.R.S.T.M. & H. (London); Director of the Gradwohl Laboratories and Gradwohl School of Laboratory Technique; Pathologist to Christian Hospital; Director, Research Laboratory, St. Louis Metropolitan Police Department, St. Louis; Fellow, American Public Health Association. Fourth edition. Three volumes, 3264 pages, 58 color plates, 1100 illustrations. St. Louis, The C. V. Mosby Company. Price $40.00.

This voluminous work is a comprehensive treatise upon clinical laboratory methods; however, the price of $40.00 is prohibitive for the majority of medical technologists. This text has a place as a reference in medical libraries for it contains considerable material not found elsewhere as well as many valuable footnotes to original articles. Volume I contains the sections on urine, blood, gastric analysis, puncture fluids, feces, and special tests; Volume II is a continuation with sections on bacteriology, serology, post-mortem examinations, tissues, museum preparations, toxicology, basal metabolism, and electrocardiography; Volume III is really a separate text limited to parasitology and tropical medicine. Dr. Pedro Kouri of the University of Havana collaborated in the preparation of this volume. The illustrations of parasites and ova are excellent. This portion of this three volume work is meritorious and instead of being the part of a text, it should be a separate volume. Dr. Kouri presents his material in a scholarly and masterful manner —despite the subject being parasitology he has made the reading unusually interesting through his directness.

The index is in volume II—thus making ready reference to Volume I somewhat awkward.

PRACTICAL BACTERIOLOGY, HEMATOLOGY AND PARASITOLOGY. By E. R. Stitt, M. D., Rear Admiral, Medical Corps, and Surgeon General, U. S. Navy retired. Graduate of the London School of Tropical Medicine. Formerly: President of the National Board of Medical Examiners, Head of the Department of Tropical Medicine, U. S. Naval Medical School, Associate Professor of Medical Zoology, University of the Philippines. Consultant in Tropical Medicine to the Secretary of War, World War II and Paul W. Clough, M. D., physician-in-charge of the Diagnostic Clinic, Johns Hopkins Hospital; Assistant Professor of Medicine, Johns Hopkins University; Associate Professor of Medicine, University of Maryland and Sara E. Branham, M.D., Ph.D., D.Sc., Senior Bacteriologist, National Institute of Health; Professorial Lecturer in Preventive Medicine, the George Washington University School of Medicine; Chairman Laboratory Section, American Public Health Association, 1946-1947, and Contributors. Tenth Edition. 991 Pages. Philadelphia and Toronto. The Blakiston Company, 1948. Price $10.00.

This new edition has been completely rewritten and thoroughly revised. The format is the same as the previous edition. As a laboratory text Stitt's work has always ranked second to none, and if a technician could only afford one reference, this book would the one of choice. The material that is presented is based upon experience and many little innovations are included which are not found in other books of this kind.

The collaboration of various authorities from the National Institute of Health greatly enhances the practical value of the

section on bacteriology, in that the procedures presented are the results of years of practical experience in the laboratory.

It is difficult to understand how several errors in the sequence of material passed the proofreaders unnoticed. For example, the illustrative diagrams showing the exact basic steps in performance of the Kahn precipitation test for syphilis occur in the midst of the section giving the reagents used in the Kolmer Wasserman test. Also the reference material in the book is very poor. Just the name of a journal and the volume number, or perhaps the last name of an author and the year in parenthesis, are certainly inadequate for the average reader of Stitt's book. If an error in quoting is suspected, the reader, unless one of the few connoisseurs of medical literature may spend hours in searching the various medical indices before finding the source material desired. Neither publishers nor authors should sanction poor references; the medical literature is too voluminous to avoid references entirely, for they are a necessary MUST in current medical writing.

Despite the inadequacy of the references, the subject matter presented is excellent, and this edition will likewise maintain the rank of second to none as a practical clinical laboratory guide for routine clinical work.

ESSENTIALS OF PATHOLOGY. By Lawrence W. Smith, M.D., F.C.A.P., formerly professor of Pathology, Temple University School of Medicine, Associate Professor of Pathology, Cornell University Medical School, and Assistant Professor of Pathology, Harvard Medical College Corresponding Member of the Royal Flemish Medical Academy of Belgium and Edwin S. Gault, M.D., F.C.A.P., Associate Professor of Pathology and Bacteriology, Temple University School of Medicine with a foreword by the late James Ewing, M.D., Memorial Hospital New York City. Third Edition. 763 pages and 740 figures, Philadelphia and Toronto. The Blakiston Company, 1948.

Since the reviewer is not familiar with previous editions of this work it is not possible to offer a comparative review. This edition is a text of pathology for medical students and it is written from this point of view. Nevertheless, it contains excellent material for reference work both by students of medical technology and nursing. What an agent of disease does to its host, if well described in an interesting manner, always makes entertaining reading for those individuals who have some interest in the various disease processes. Throughout there is considerable technical detail found in the descriptions of pathological processes, especially those caused by parasitic infestations.

The diseases are described as they affect the different systems

and organs comprising a system. This book is interestingly written and the material is presented in a manner which keeps the readers interest alive. One feels a living pathology rather than the pathology of the dead. Case histories are given to illustrate the course of various diseases in addition to accompanying commentaries.

MEDICAL WRITING: The Technic and the Art. By Morris Fishbein, M.D., Editor, The Journal of the American Medical Association with the assistance of Jewel F. Whelan, Assistant to the Editor. Second Edition. 292 pages. Philadelphia and Toronto. The Blakiston Company, 1948. Price $4.50.

In the opinion of the reviewer, no person is better qualified to write upon the subject of Medical Writing than Dr. Fishbein. His work as an outstanding editor covers a period of more than 30 years in the editorial department of the Journal of the American Medical Association. The volume contains what every person writing for the medical profession should know about medical writing, i.e., *how to write a medical article that is worthy of being read, and acceptable to editors of recognized medical journels.*

The material covered is as follows: An acceptable paper, style, the subject and the material; the construction of the manuscript, words and phrases, spelling, capitalization, abbreviations, numbers, bibliographic material, preparation of the manuscript, illustrations, tables and charts, revision of the manuscript, proofreading, and indexing. The accepted abbreviations of the names for periodicals are given, and those periodicals which are listed in the Quarterly Cumulative Index Medicus are included alphabetically. Those periodicals which are not indexed are also listed.

Few books contain so much information in so few pages. The style is flowing; the material interesting, and the language simple and direct to the point. Any one who contemplates preparing a manuscript upon a medical subject should study the comments made by Dr. Fishbein in this work concerning the preparation of papers for publication.

Although this book was written expressly for physicians, it should fill the same needs among medical technologists. Furthermore, since the Journal of the American Society of Medical Technologists is indexed by the Cumulative Quarterly Index (a publication of the American Medical Association), the medical technologists who contribute to this journal should use the same standards in writing papers as those which are required and deemed essential by the editorial staff of the Journal of the Americal Medical Association.

Thus in review, this book is evaluated a requisite for those technologists who write papers for publication and to those

schools of medical technology which require term papers of their students. Any technologist who really desires to accumulate authoritative data concerning *the art and technic* of medical writing will not regret spending four and one-half dollars for this timely little volume.

VIRAL AND RICKETTSIAL INFECTIONS OF MAN. Edited by Thomas M. Rivers, M.D., Director of the Hospital, The Rockefeller Institute for Medical Research. 587 pages, 77 illustrations including 6 plates in color. Philadelphia, London, Montreal. J. B. Lippincott Company, 1948. Price $5.00

Twenty-seven outstanding authorities on virus and rickettsia have contributed in the making of this book into a splendid edition for information in this new field of applied ultra microbiology. During the past few years knowledge and ideas about viruses and rickettsia have stabilized and technics have been worked out which prove these agents as the actual cause of disease. All of this newer knowledge is incorporated into this new work.

This book was written for physicians, not medical technicians but the technology which is included in this volume should become a part of every technician's training. Particularly noteworthy are the chapters on physical and chemical procedures, serologic reactions in viral and rickettsial infections, chick-embryo technics, and propagation of viruses and rickettsia in tissue cultures.

By an aid from The National Foundation for Infantile Paralysis it has been possible to offer this book at the price of $5.00, which is far below the cost of producing this volume. No laboratory doing virus and rickettsial studies should be without this volume, nor should training schools for medical technologists be without it in their libraries. The bibliographic material is par excellent.

HISTORY OF MEDICINE: A correlative Text, arranged according to subjects by Cecelia C. Mettler, A.B., Ed.B., A.M., Ph.D., Late Assistant Professor of Medical History, University of Georgia, School of Medicine, and late Associate in Neurology, College of Physicians and Surgeons, Columbia University. Edited by Fred A. Mettler, A.M., M.D., Ph.D., Associate Professor of Anatomy, College of Physicians and Surgeons. Columbia University. 1215 pages and 16 illustrations. Philadelphia and Toronto. The Blakiston Company, 1947. Price ? ? ?

The author traces the history of the various divisions of medicine under these groupings: anatomy and physiology, pharmacology, pathology and bacteriology, physical diagnosis, medicine, neurology and psychiatry, venereology, dermetology, pediatrics, surgery, obstetrics and gynecology, ophthalmology and otology

and rhinolaryngology.

Verbosity flourishes throughout the book; it is exceedingly difficult to read, the style is stiff; the transitions are poor. Frequently the subject matter seems inconsistent with the general trend of thought.

Considerable historical data are included which are not found in other medical histories. The extensive quotes from the ancient literature attest that years of work were spent in the preparation of this volume.

ABSTRACTS

Histology

THE EXAMINATION OF SPUTUM FOR TUMOR CELLS. W. F. Matthews, Montreal, Quebec, Canada. Can. Med. Jour. 58:236 (March) 1948.

Twenty-four hour or overnight sputum specimens are collected, and the bulk of the sample placed in a gauze bag. The material is fixed in Bouin's solution. Then it is blocked, sectioned, and stained with hematoxylin and eosin.

BACTERIOLOGY OF DIARRHOEAL DISEASES. Alfred J. Contor, Flushing, New York, Am. Jour. Dig. Diseases, 15:60 (Feb.) 1948.

This author states there are normally four large groups of bacteria in the feces, namely: the colon group, the streptococci, the anaerobes, and the lactobacillus group. Other less common organisms found in feces are B. Proteus, B. Pyocyaneous, B. Faecalis alkaligenes and B. Lacis aerogenes. Normally the ratio of gram positive organisms in the colon is 7-10. Spirochaetes are usually considered saprophytic. Fungi are very frequent.

Typhoid bacilli and Salmonella bacilli find optimum conditions for growth in the small intestines; Tularense bacilli and cholera vibrios also thrive there. In the high colon (caecum and descending colon) the tubercle bacilli, protozoan parasites, the shigella, streptococci, and staphylococci find a favorable medium.

Organisms responsible for Diarrhea are:

I. Protozoa
   1. Endamoeba histolytica
   2. Giardia lamblia

3. Balantidium coli
4. Chilomastix mesnilii
5. Isopora bigemina
6. Leishmania donovani
7. Plasmodium falciparum
8. Dientomoeba fragilis
9. Toxoplasma gondii

II. Bacteria
1. Shigella
2. Streptococci
3. Salmonella
4. Tubercle bacilli
5. Cholera vibrio
6. Treponema pallida
7. B. Typhosa
8. Occasional invaders (Staphylococci, pneumococci, Friedlanders, B. Proteus vulgaris, influenza bacilli, virus lymphogranuloma venerum, and the necrobacillus.

III. Parasites
1. Hookworm
2. Oxyuris vermicularis
3. Ascaris lumbrocoides
4. Trichenelli spiralis
5. Trichuria trichuria
6. Strongoloides intestinalis
7. Tapeworms (Taenia saginata, solium; Hymenolosia nana: Diphyllobothrium latum)
8. Fasciolopsis buskii
9. Schistosoma mansom and japonicum
10. Heterophids
11. Oesophagostoma

Continuation ibid, 15:88, (March) 1948

Apparatus required for bacteriologic study
1. Sigmoidoscope and sigmoidoscope aspirator
2. Warm stage microscope
3. Slides and cover slips
4. Warm sterile saline, culture tubes, culture plates
5. Equipment for securing blood specimens for Wasserman and agglutination tests.

Cultures should be made on EMB, blood agar, bile and salt agar, and glucose broth. Sometime SS agar and desochylate agar are desirable. Smears are made and studied with acid fast, gram stain and Haidenhain's iron and hematoxylin stains.

Sometime Giardia lamblia is found in duodenal contents.

The most common allergens causing diarrhoea are wheat, milk, cabbage, eggs, tomatoes, oranges, and chocolate.

A METHOD FOR COMBINED POSITIVE AND NEGATIVE STAINING OF BACTERIA. P. Bruce White, National Institute for Medical Research, Hampstead, London, Jour. Path. and Bact. LIX, 334 (Jan.-Apr.) 1947.

The process takes about the same amount of time as the gram stain. It is possible to stain dead bacteria with congo red, and by combining this with methylene blue, the living bacteria are stained. With this technic the live organisms stain blue and the dead ones dark brown or purple.

1. Flame glass slides to remove any trace of grease.
2. Place a drop of nearly saturated aqueous solution of congo red containing about 10 per cent serum on a slide and mix some of an agar grown culture with it.
3. Spread mixture into a film of varying thickness, dry, and fix in flame.
4. Allow to cool, and then flood with a 0.5 per cent aqueous solution of HCl. Drain, blot gently and drain off any excess acid with gentle heat.
5. Stain 15-20 seconds with a 1 per cent aqueous solution of Methylene blue which may be aciduated with glacial acetic acid in the proportion of one drop of acid to 20 ml of stain.
6. Drain off stain, do not wash. Blot, dry, and examine.

Hematology

METHODS TO INCREASE ACCURACY IN THE USE OF HAYEM'S SOLUTION FOR RED BLOOD COUNTS. Edna M. Tompkins, M. D. from the Department of Applied Physiology, Yale University, New Haven, Conn. Jour. Lab. and Clin. Med., 33:1180 (Sept) 1948.

The author has added gelatin to Hayem's solution and finds that the red blood counts made with the modified solution show less deviation than when done with the original formula or that of Jorgensen.

The formula is as follows:

Na_2SO_4	2.5 Gm
NaCl	0.5 Gm
$HgCl_2$	0.25 Gm
Gelatin	0.01 Gm (Difco)
H_2O (distilled)	100 ml.

One-half of the water is used for dissolving the mercuric chloride and the other half is used to dissolve the sodium chloride, sodium sulfate and the gelatin. When the two solution are complete, they are mixed together. Care must be exercised to prevent foaming.

THE PRESIDENT OF A.S.M.T. SAYS

This is your organization. We can grow only through the cooperation of each member. There is not one among the 1700 newly registered medical technologists of 1948 who is not a potentially enthusiastic member of A.S.M.T. Among the other 8000 older registrants there should be many more members. What have YOU done toward encouraging them to belong to their professional organizations?

Tell them that as members of A.S.M.T. they will receive the AMERICAN JOURNAL OF MEDICAL TECHNOLOGY. The A.S.M.T. with the financial assistance of the Board of Registry, has encouraged a number of state societies to hold seminars. The Board of Registry has promised to continue this help. The March issue of the journal will have an announcement regarding this and will give more specific directions as to the procedure involved. The Education Committee will be responsible for assisting in the distribution of this fund.

The Board of Directors has voted upon a number of questions since their last meeting in June, 1948. The Board voted to increase the convention registration fee to $3.00, and to confirm the dates of the 1949 convention which will be held in Roanoke, Virginia, from June 20-23, 1949. As the House of Delegates had voted to cooperate with UNESCO if invited to participate in any of the activities of that organization, the Board voted that Miss Ida Reilly, president-elect, attend the UNESCO meeting in Boston in September. (The November journal carried a report of that meeting.) The Board was also asked to vote upon one special case of a state laboratory organization whose Constitution and By-Laws does not conform to that of the A.S.M.T. In all fairness to those state societies who cooperate with the national organization, the Board could not allow this exception.

The Board also voted that the membership be notified through the pages of the journal that the terms of office of the Executive Secretary and of the Editor-in-chief of the AMERICAN JOURNAL OF MEDICAL TECHNOLOGY expire on June 30, 1949. The matter of a full-time Executive Secretary is being taken under consideration.

Among other matters being considered is the possibility of a special meeting of the Board of Directors so that the many problems which have arisen during the past six months may be discussed more fully than is possible by mail or wire.

It is hoped that in the next six months of this fiscal year many of the problems that have arisen with the change in mode of operation of the state and national societies will be solved. This can be done if each member considers himself a committee of one to share with all other members the responsibilities which

arise. We have come a long way in our short life as one of the professions, and we expect great things in the New Year.

Rachel Lehman, President.

THE GENERAL CHAIRMAN OF THE 17th ANNUAL CONVENTION OF A.S.M.T.

Wants to know WHY you are coming to the convention? Is it to have a good time? We hope that you will. Our Entertainment Committee is planning a program that should enable everyone to enjoy himself and his company. Or are you coming for the Scientific Program? If so, we feel that your interest will be satisfied because preliminary reports indicate that our program will be outstanding. Perhaps it is the latest in laboratory equipment and materials that brings you? We shall have exhibits, both scientific and technical, that will interest and please you.

It is not our intention to take away from the value of the above-mentioned, for surely our interest in our profession demands that we keep abreast of advances in medical science; and surely, too, we realize the value of relaxation. But let us not forget that our organization meets once a year to conduct its business. When our Articles of Incorporation and By-Laws were revised in 1947, provision was made whereby any member of A.S.M.T. (in good standing) will be eligible to attend the meeting of the House of Delegates as a visitor. How can the members better acquaint themselves with the problems and the progress of medical technology and A.S.M.T. than by attending these sessions?

We feel confident that you will return from the convention a better A.S.M.T. member and a better Medical Technologist if you avail yourself of all the opportunities offered you at the Roanoke Convention.

Ida Reilly, General Chairman,
Roanoke Hospital Association,
Roanoke, Virginia.

THE CHAIRMAN OF THE ENTERTAINMENT COMMITTEE OF THE SEVENTEENTH ANNUAL CONVENTION OF A.S.M.T., JUNE, 1949

Wants to know what talents YOU are hiding beneath that bushel basket? She is a good scout (she hopes) and wants to know what you, as an individual, as a local group, as a district society, or as a state organization, can do to provide entertainment for an evening of informal frolic during our 1949 convention. Please, if you would like to present a skit, or would like to sing, or otherwise show what you can do beside handle test tubes and pipettes, tell Miss Irma Graff, Entertainment Committee

Chairman, 111 Walnut Ave., S. W., Roanoke, Virginia, all about it and offer to do YOUR part.

ARE YOU GOING TO ROANOKE NEXT JUNE?
(June 20-23, 1949)

Already the General Chairman has been receiving requests for hotel reservations for the 1949 A.S.M.T. Convention. This is encouraging; we want you to be in Roanoke for the seventeenth annual meeting, and to take part in making it a success. Because these requests have started coming in, we feel that it would be well to include below the hotel reservation form.

Hotel Roanoke is the headquarters. There are NO SINGLE ROOMS available. In order that as many as possible may be accommodated in the headquarters hotel, we would appreciate it if members will arrange to share rooms or indicate their willingness to be assigned a roommate by the Housing Committee. In case of two persons making reservations together, confirmation will go to the first one making the request. Please do NOT send any money to the Housing Committee. BE SPECIFIC ABOUT YOUR ARRIVAL DATE.

Date of Arrival:_____

Time: A.M._____ P.M._____ After 6:00 P.M._____

Date of Departure:_____ Time:_____

Name:_____

Address:_____

Please indicate accommodations desired:

Room for two (twin beds): $8.00_____ $9.00_____

Suites: Small: $15.00_____ Large: $18.00_____

If no room is available at the rate requested, reservations will be made at the next higher rate.

Sisters desiring accommodations, please communicate with Sister M. Rosaria (Brennan), Mercy Hospital, Charlotte, North Carolina.

Note to those who are driving: It has been suggested that some who drive to Roanoke may wish to stay at a Tourist Court. There are a number of Courts within ten to fifteen minutes drive of the Hotel. If you are interested, please contact the Housing Committee Chairman.

SEND ALL RESERVATIONS TO: MRS. FRANCES HENRY CROUCH, 1405 Hillcrest Avenue, Roanoke 12, Virginia.

1949 CONVENTION PROGRAM

With due consideration to all phases you want included in the Convention Program, the following are the tentative outlined plans for the Seventeenth Annual Meeting, with headquarters at the Hotel Roanoke, Roanoke, Virginia.

Sunday, June 19

Reception and registration.

Monday, June 20

8:30 A.M. Registration opens.

9:30 A.M. Formal opening of Convention.
10 to 12 Noon, Scientific Program.
12 to 1:30 P.M. Recess.
1:30 to 2:30 P.M. Formal opening of Technical and Scientific Exhibits.
2:30 to 5 P.M. Scientific Program.
6 P.M. Dinner (informal) at Hotel Roanoke.
7:30 to 10 P.M. Exhibits open for inspection.

Tuesday, June 21
9 A.M. to 12 Noon. Scientific Program.
12 to 1:30 P.M. Recess.
1:30 to 3 P.M. Visit Exhibits.
3 P.M. Leave for Natural Bridge Visit.

Wednesday, June 22
8:30 A.M. to 8 P.M. Exhibit open.
8:30 A.M. Advisory Council Meeting.
10 to 11:30 AM. Scientific Program.
1 P.M. House of Delegates Meeting.

Thursday, June 23
8:30 A.M. Breakfast to be arranged by Entertainment Committee at Hotel Roanoke.
10 A.M. to Noon. Exhibits open.
10 to 1 P.M. Scientific Program.
1 to 2:30 P.M. Recess.
2:30 to 5 P.M. Scientific Program.
7 P.M. Convention Banquet.

NOW is your opportunity to have a definite SHARE in the progress of medical technology. Help us to continue in the effort to make others cognizant of the fact that the medical technologists THEMSELVES are great contributors to this advancement. Your participation by reporting on special research projects, comparative evaluation studies, you experience with new techniques, or your way of solving problems encountered in any of the routine procedures, will exemplify the ACTIVE PART assumed by A.S.M.T. MEMBERS. The following notes will remind you of the important rules applying to the PROGRAM:

1. The DEADLINE DATE for papers to be received by the Program Committee Chairman from individuals desiring to present papers in Roanoke and likewise to compete for the Convention Awards is MARCH 15th, 1949.

2. Only A.S.M.T. Members are eligible to compete for Convention Awards. All competitive papers must be presented in person or by proxy at convention time.

3. All papers read (by members) before the annual Convention or submitted to the Society become the property of A.S.M.T.

and may be published in the AMERICAN JOURNAL OF MEDICAL TECHNOLOGY.

4. The time limit for reading the paper on the program is 15 to 20 minutes* exclusive of showing slides—the remainder of approximately 30 minutes is to be given to discussion.

5. All audio-visual aids and professional technicians to operate them will be supplied by the Speakers Supplies Committee. Please indicate what aids are needed.

6. FIVE (5) copies of your manuscript must be submitted to the Program Committee Chairman. These must be typewritten, double spaced on regular size typewriting paper.

7. TWO (2) copies of the manuscript must be submitted by all those NOT COMPETING for ASMT Awards and subject to the instructions above.

8. PRIZE PAPERS from State Contests to be considered for presentation and further awards, must be in the hands of the Program Committee Chairman by MARCH 15th, 1949.

PROGRAM COMMITTEE

Chairman, Mary F. Eichman, 440 Lyceum Avenue, Philadelphia 28, Pa.
Ruth Church, 201 S. Broom Street, Wilmington, Del.
Evelyn Ballou, 4105 Third Street, N. W., Washington, D. C.
Elizabeth Frey, 678 William Street, Buffalo, N. Y.
Joy Austin, 10 Oakhurst Circle, Charlottesville, Va.

*Papers may be longer and abstracted for Program purposes.

EDUCATION COMMITTEE

Courses in Papanicolaou Technic

The following data has been compiled from several institutions throughout the United States and Canada in respect to the training and instruction in Papanicolaou. The following institutions offer courses in this study.

McGill University, Montreal, Canada.
Length of course: Two weeks.
Tuition: $100.00.
Time: Any two week period except 2/1/49 to 2/15/49.
Number of students: A few.
Additional training: Cystological techniques, microscopic interpretation. This training will take from six to twelve months. No openings at present time.

Cornell University, Medical College 1300 York Ave., New York City, N. Y.
There is a course given here, but no definite figures or details for the Spring. At present there is a class under instruction.

The Hospital for Joint Diseases, 1919 Madison Ave., New York 35, N. Y. (Dr. J. J. Golub).

Length of course: A minimum of three months.
Tuition: $20.00 to $50.00 for materials used in training.
Requirements: A well trained technician.
Time: School will be ready in the near future.

The above data can be elaborated on by corresponding with the individual institutions.

STOP LOOK READ

FELLOW TECHNOLOGISTS

If it is help you need:

1. In planning your monthly program
2. In obtaining material for your monthly program
3. In securing films or short educational features to keep abreast with this fast progressing field
4. In solving a technical problem

write your Education Committee. We don't promise the impossible, but we will try to find the answer if one is to be found.

WATCH THIS SPACE EACH MONTH

(If interested, note it—If not, forget it)

HEPATOGRAM

SUMMARY OF FUNCTIONS OF THE LIVER

Functions*	Metabolism*	Laboratory Tests
Lipoid Metabolism	(1) Through bile promotes the digestion and absorption of fats and storage of fats.	
	(2) Possibly involved in the synthesis, storage and destruction of cholesterol.	Cholesterol Cholesterol Esters
	(3) Desaturation and oxidation of fatty acids; formation of ketone bodies.	
	* * * * * * * * * *	
Bile Metabolism	(1) Production of bilirubin from hemoglobin by the Kupffer cells.	Van den Berg Icterus
	(2) Excretion of bilirubin.	Feces for bile pigments
	(3) Formation and destruction of bile salts.	Urine bilirubin and urobilin

* Kolmer, John A., CLINICAL DIAGNOSIS BY LABORATORY EXAMINATIONS, First Edition—Revised D. Appleton—Century Company, 1944.

HERE YOU ARE—SOME HELPFUL MATERIAL FOR YOUR MEETINGS

Available Films

1. Schistomiasis
2. Animated Hemotology
3. Bone Marrow
4. Excystation of Endamoeba histolytica
5. Entamoeba of the Human Intestine

6. Excystation of E.histolytica
7. The Life History of E.histolytica
8. Amebiasis
9. The Anemias
10. Sulfonamide Therapy

All pre-viewed. They are good, interesting, educational, technical. Give plenty of time when booking because they are very popular. Do not delay—write now to MISS ROSE HACKMAN, 4200 East 9th Ave., Denver 7, Colorado, who can give you all the necessary information.

To the Members of the American Society of Medical Technologists

The Board of Registry is deeply appreciative of the assistance of the Advisory Committee of Medical Technologists, at its recent meetings in Chicago. The advice of these registrants greatly aided the Board in its deliberations. Their close contact with other medical technologists and familiarity with their problems, enabled the members of the Advisory Committee to offer thoughtful and practical suggestions for the solution of the many problems facing the Board.

The Board was pleased, also, to see the interest in the exhibit of the American Society of Medical Technologists, shown by the pathologists and visitors to the exhibits at the recent meeting of the American Society of Clinical Pathologists. It is our belief that this excellent exhibit did much to bring to the attention of the pathologists the fine job being done by the Society.

Sincerely yours,
Lall G. Montgomery, M. D.
Chairman, Board of Registry.

AUTOMOBILE EMBLEMS

The limited supply of A.S.M.T. automobile emblems has been sold. However, more have been ordered. Watch the Journal for an announcement of the new supply.

MISCELLANEOUS ANNOUNCEMENTS

The ALABAMA Society of Medical Technologists held a Symposium on the subject of "Mycotic Infections and Techniques in Their Diagnosis" on November 20, 1948, at the Medical College of Alabama in Birmingham. Among the papers presented were: "Technique for Studying Fresh Preparations and Culturing of Fungi," by Mary Virginia Stallworth; "Classification and General Characteristics of Pathogenic Fungi," by Dr. Irving D. London; "Mycotic Diseases of the Hair and Skin," by Dr. Paul Reque; "Mycotic Vulvovaginitis," by Dr. Louise Branscomb; "Gentian Violet Medium as a Screen Test for Identifying the

Candidae," by Louise R. Cason, MT, and Mary Katheryn Armour, MT; "Mycotic Infections of the Central Nervous System," by Dr. J. A. Cunningham; "Mycotic Diseases of the Lungs," by Dr. Louis L. Friedman; "Histoplasmosis," by Dr. Charles H. Winkler, Jr.

The ARKANSAS Society of Medical Technologists held their annual meeting at the Hotel Marion, Little Rock, on September 25, 1948. Dr. Carl A. Rosenbaum spoke on "A New Test for Cancer," and Dr. John R. Totter on "Nutrition Survey of Eskimoes in Alaska." The dinner meeting was followed by a business session.

The COLORADO and WYOMING Societies of Medical Technologists held a joint Seminar in Cheyenne, Wyoming, on October 17, 1948. The guest speaker was Dr. J. J. Andujar, of Harris Memorial Methodist Hospital, Fort Worth, Texas, who spoke on "Cardiolipin Tests for Syphilis." Georgia Schmidt, MT (ASCP), of the Wyoming Society presided, and other speakers included Dr. S. S. Zuckerman, Director of Laboratories, Memorial Hospital, Cheyenne; Dr. E. R. Mugrage, Department of Clinical Pathology, University of Colorado Medical Center, Denver; and Mrs. Virginia Wier, MT (ASCP), president-elect of the Colorado Society, who gave a brief talk on the history and purpose of these meetings. Twenty-three Wyoming members and guests, and twenty-seven Colorado members were in attendance. The Colorado group is fortunate in having as a member of their organization, Allyne Lawless, MT (ASCP), who took the responsibility of chartering the bus for the trip. They are now making plans for chartering a bus and organizing a two weeks vacation tour which will include the National Convention in Roanoke, Virginia, next June.

The ILLINOIS Association of Medical Technologists announces that they held a dinner meeting on November 14, 1948, in Chicago, which was attended by some fifty members of their organization. Among the guests were Mary Eichman, MT (ASCP), of Philadelphia, and Lucille Wallace, MT (ASCP), of Virginia, Minnesota, who spoke on the interpretation of the national society constitution on membership and of the work of the society with the Civil Service Council. Phyllis Stanley, MT (ASCP), of Newark, New Jersey, spoke on the subject of licensing technicians in that state. Dr. Opal Heppler, an Honorary member of the Illinois Association, was also a guest.

The first annual convention of the MISSISSIPPI Society of Medical Technologists was held in Jackson, on October 9, 1948, with an attendance of thirty-one members. The general theme of the program was "Standardization of Technology in the State of Mississippi." There were talks on "The History and Modern

Trend of Blood Banks," "The Blood Bank Plan," "The Rh Factor," "Accuracy of Chemical Analyses in the Clinical Laboratory," as well as those on "The Small Hospital Laboratory," "Standards of the Office Technician," and in a "Veterans Administration Hospital." A Panel discussion on Personnel and Laboratory Standards was participated in by Frances Lucas, MT (ASCP), Margaret Mansel, MT (ASCP), Isabel Smith, MT (ASCP), and Mrs. F. Freeman, MT (ASCP). The business session and a dinner followed the above program.

The MICHIGAN Society of Medical Technologists held its annual Convention on October 30, 1948, in Detroit. Among the scientific subjects presented were discussions on the subjects of "Anaerobic Culture Methods," by Doris Miller, MT (ASCP); "Micro-Chemistry Procedures," by Jean Buchanan, MT (ASCP); "Application of Liver Function Tests," by Mildred Schulte, MT (ASCP); and papers on "The Liver—Its Function and Pathology," by Dr. George Daurelle; "The Laboratory Procedures in Toxicology Examination," by Dr. Edward Zwadski; and "Medical Mycology," by Mary Elizabeth Joy, MT (ASCP). Mary Catherine Wethington, MT (ASCP), presided at the business meeting.

The NEW MEXICO Society of Medical Technologists and X-Ray Technicians held a joint Seminar in Albuquerque on September 25-26, 1948. The scientific program of interest to technologists consisted of talks on "Anticoagulants," by H. L. January, M. D.; the "Rh Factor," by Sister Charles Miriam, MT (ASCP); "Enteric Organisms," by R. B. Johnson, Ph.D.; "Anemias," by Roy R. Robinson, M. D. The business meeting of the New Mexico Society was held at this time. The final event was a luncheon at which Sister Charles Miriam, MT (ASCP), presided, and at which L. B. Pousson, Ph.D., of the Catholic Teachers College, was the principal speaker.

The OKLAHOMA Society of Medical Technologists held its fall Seminar in October, 1948, in Tulsa.

The PENNSYLVANIA Society of Medical Technologists and Laboratory Technicians will hold its annual Seminar on Saturday, April 23, 1949, at the Philadelphia County Medical Building, 21st and Spruce Streets, Philadelphia.

The 17th annual convention of the TEXAS Society of Medical Technologists will be held in Fort Worth on April 15 and 16, 1949. Miss Dorothy Patras, Harris Memorial Methodist Hospital, Fort Worth, is Program Chairman.

Editor's Note: If we have information regarding your conventions and Seminars before they are to be held, we are glad to publicize them. Potential new members of your state organization may be readers of the journal.

STATE SOCIETIES

ALABAMA: President: Mary Frances James, 812 So. 20th St., Birmingham 5.
Vice-Pres.: Miss Lois E. Van Tassell, 725 Woodward Bldg., Birmingham.
Secretary: Miss Evelyn V. Pow, 1124 So. 20th St., Birmingham.
Treasurer: Miss Erma L. Salter, 708 Tuscaloosa Ave., Birmingham.
Board Members: Mrs. Nellie M. Butler, 2219 Highland Ave., Birmingham; Miss Madie E. Murphy, 2030 Highland Ave., Birmingham; Miss Ruth L. Miller, 119 Bonita Drive, Birmingham.

ARIZONA: Sr. Charles Miriam Strassell, St. Joseph's Hospital, Albuquerque.

ARKANSAS: Pres. Mrs. Rosemary Wright, Davis Hospital, Pine Bluff; Vice-Pres. Mrs. Louise Sadler, 1305 West 25th St., Pine Bluff; Secretary: Sister M. James (Poirot), St. Bernard's Hospital, Jonesboro; Treasurer: Lorene Nussbaum, St. Bernard's Hospital, Jonesboro; Chairman: Lila L. Church, 2116 Orange St., North Little Rock.

CALIFORNIA: Pres. Martha A. Lee, 14239 Victory Blvd., Van Nuys; President-Elect: Barbara Isbell, Vet. Admin. Reg. Office, 325 "B" St., San Diego 1.
Secretary: Hazel Current, 918 17th St., Santa Monica.
Treas.: Amelia Clark, 1232 16th St., Apt. 103, Santa Monica.
Membership Chairman: Jeanne Jorgenson, 900 Modoc St., Berkeley 7.

COLORADO: Pres. Lavina White, Clinical Laboratories of C. W. Maynard, M.D., Pueblo.
Pres.-Elect: Virginia Weir, 1104 Republic Bldg., Denver 2.
Secretary: Mary Fox, 661 Monroe, Denver 6.
Treasurer: Rose Hackman, 4200 E. 9th St., Denver 7.
Membership Chairman: Loretto Hamilton, 516 Republic Bldg., Denver.

CONNECTICUT: President: Florence Pease, Box "W," Newtown.
Pres.-Elect: Anita Charboneau, St. Joseph's Hospital, Stamford.
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Treasurer: Eleanor Hapgood, Stamford Hospital, Stamford.
Membership Chairman: Bertha Diem, St. Francis Hospital, Hartford.

DELAWARE: President: Georgene Martha Withers, Delaware Hospital Lab., Wilmington 13.
Pres.-Elect: Mr. Evelyn G. Scott, 4 Chaplain Ave., Wilmington 131.
Secretary-Treasurer: Mrs. Helen Rairigh, 1693 Concord Pike, Wilmington 284.
Board of Directors: Mr. George A. Neville, Biochemical Research Foundation, Newark; Ruth M. Church, care of Nurses' Home, Wilmington General Hospital, Wilmington.

DISTRICT OF COLUMBIA: President: Mary Ellen Hunter, 1 East Bradley Lane, Chevy Chase, Maryland.
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IDAHO: Membership Chairman: Winogene N. McIntyre, c/o Dr. B. C. McIntyre, St. Johns, Washington.

ILLINOIS: President: Cecelia Korteum, 1164 N. Dearborn, Chicago 10.
President-Elect: Ellen Skirmont, 5493 South Cornell, Chicago 15.
Secretary: Helen Gurley, Mt. Sinai Hospital, Chicago.
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Chief laboratory technician; preferably male, should be experienced in all major routine and special laboratory tests; background in parasitology with some training in chemistry desirable; knowledge of x-ray advantageous although not prerequisite; new hospital operated under American auspices in Venezuela; $4800. MT1-1.

Endocrine research chemist capable of doing endocrine assays; 15-man clinic operating own hospital of fairly large size, university affiliation; interesting expansion program; small town, short distance from university medical center. MT1-2.

Experienced technician for department of histology, large teaching hospital and, also, assistant technicians; salaries open but probably for experienced technicians, $3500; university medical school; East. MT1-3.

Bacteriologist and biochemist; 1200-bed general hospital having university affiliation; large laboratory service; duties of bacteriologist principally streptomycin research; duties of biochemist, supervision of chemistry and individual research; $5200. MT1-5.

Laboratory technician to take charge of laboratories, eight-man clinic operating own hospital; closed staff; $3500; California. MT1-6.

Supervisor for blood bank; one of the country's largest private practice clinics; teaching affiliations; should be qualified to supervise bank drawing 600 bloods monthly; should be thoroughly trained in laboratory procedures and able to direct work of others. MT1-7.

Chemistry technician to assist pathologist, Diplomate of American Board having busy private practice and directing laboratories of two hospitals; college town of 100,000, Middle West; $300 with increase later to $400. MT1-8.

Technician qualified in x-ray and laboratory work to take charge of department, private practice group; one of the larger towns in Alaska; $340 including furnished apartment. MT1-9.

Oxygen therapy technician qualified for position of head technician; considerable experience, required; should be able to supervise and train others; large teaching hospital; Middle West metropolis. MT1-11.

Well qualified histological laboratory technician; person of college and scientific background, preferably with experience in hard tissue nitrocellulose technic; department of histopathology, university school of dentistry; Pacific Coast. MT1-12.

Two hematologists; laboratories of university school of medicine; West. MT1-14.

Laboratory technician; department connected with private practice clinic; staff of three technicians; pathologist, diplomate of American Board in charge town of 10,000 in San Joaquin Valley; should be eligible for California licensure; minimum $325. MT1-15.

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(In requesting information concerning these appointments, we shall appreciate your mentioning the key numbers.)

M. BURNEICE LARSON

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